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[OFFICIAL NOTICE.]

Fourth Annual Meeting of the Ohio Gas Light Association.

To the Members of the Ohio Gas Light Association:—Gentlemen: As heretofore announced the Fourth Annual Meeting of this Association will be held at Sandusky, Ohio, convening at 10 A.M., March 21, 1888, and continuing two days.

Our headquarters will be the Sloane House, where the very reasonable rate of $2 per day has been secured for members and their families and visitors in attendance at the meeting. The several sessions will also be held in a suitable room in the hotel.

Arrangements have been made whereby the members can, if they so desire, devote a portion of the afternoon of the second day of the meeting to an excursion to Findlay, where the famous Karg well will be lighted for their edification. The excursion train will return to Sandusky the same evening, and the rate for the round trip will be $1.80 *per capita.*

The following papers are promised for the meeting:

"The Use of Lima Crude Oil for Carburetting Water Gas," by Geo. H. Christian, Jr., Norwalk, O. "Policy of Gas Companies as to Incandescent Electric Lighting," by F. W. Day, Columbus, Ohio. "Methods of Inducing Non-Consumers to Use Gas," by J. W. Alexander, Painesville, O. "A few Words on Incandescent Gas Lighting," by Geo. W. Graeff, Jr., Phila., Pa. "Natural Gas and its Effect on the Consumption of Coal Gas," by E. B. Philipp, Findlay, O. "The First Cost of Gas Stoves and Engines," by E. C. Gwyn, Springfield, O. "Fuel Gas," by J. M. Critchlow, Pittsburgh, Pa. "The Legality of Making more than One-Year Contracts with Cities," by Herman Wilkiemeyer, Lancaster, O. "Personal Experiences with Naphthaline," by Edward Lindsley, Cleveland, O. "The Management of Small Gas Works," by P. J. Wood, Wilmington, O. "The Effect of Specific Gravity, Atmospheric Pressure and Temperature upon the Consumption and Candle Power of Illuminating Gas," by J. Gwynn, Fostoria, O. "Purification in Closed Vessels" by Geo. Shepard Page, New York City. "An Experience with Choked Stand-pipes," by Moses Coombs, Jr., Youngstown O. "Our Future Prospects," by Thos. Wood, Sandusky, O.

It is hoped that the above list, together with other attractions of the meeting, will be a sufficient inducement for every member to be present and help make the discussions interesting and profitable. And it is especially urged upon all gas men of the State, who are not already members of the Association, to make their arrangements to attend this meeting, and be convinced of the advantages and desirability of membership therein. Respectfully, IRVIN BUTTERWORTH, Secy.

[OFFICIAL NOTICE.]

Eleventh Annual Meeting of the Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION,
QUINCY, ILL., March 10, 1888.

The Eleventh Annual Meeting of the Western Gas Association will be held at Chicago, Ill., on the 9th, 10th and 11th days of May.

The Grand Pacific has been chosen for our headquarters, and the finest hall ever placed at our disposal, in the immediate vicinity of the hotel, will be used for the business sessions of the Association. Hotel rates to members will be $3 per day, with baths, and rooms on the parlor floor, extra. It will be well for our members to secure their rooms in advance, which can be done by writing to the proprietor of the hotel and accompanying their request with a statement of the kind and price of rooms desired.

Your Secretary has received a fairly encouraging number of replies from those to whom papers have been assigned. Will those who have so far delayed in their acceptance of the honor thrust upon them, kindly transmit an immediate and affirmative reply to the writer, as the list should be complete for publication in these columns in time for the next issue of the JOURNAL. A. W. LITTLETON, Secy.

THE SANDUSKY CONVENTION.

Secretary Butterworth having, as was to be expected, successfully carried on the preliminary work in connection with the Fourth Annual Meeting of the Ohio Association, it now rests with the members, by their prompt appearance at the Sloane House in a few days, to determine whether or not the '88 session is to be the great success which every indication so far gives promise of. From the official list of the papers that are to be read, even the most pessimistically inclined must admit that the youngest of all the Associations shows no disposition to recede from the activity which has been so characteristic of its earliest efforts. It is an open secret that not a few of those who curiously watched the sprouting of the Ohio Association into life asserted their belief that the vigor of its first and second sessions was but certain evidence pointing to subsequent indifference, to be followed by early decay. Well, if Secretary Butterworth's current presentation of the case is right, the curious watchers, so far, have been wrong in their guess; and we incline to the opinion that

as the Ohio Association advances to maturity, so also will its vigor increase.

Indeed, the Sandusky gathering, to be presided over by a Printz (although the pun is bad, the stated fact remains unaffected) of the fraternity, seems to threaten a veritable embarrassment of riches, in that the length of the list may cut off some portion of the hours which should be justly allotted to debate. Again, there is another time shortener in the way, in the shape of the proposed visit to the famous, and justly so, Karg well of natural gas at Findlay. It may be taken for granted that all will wish to make the journey to Findlay, for a more majestic or impressive sight is not to be seen in all the West than that afforded by the Karg well when in illuminated action. A spur to further increase the wish to behold this wonder of nature, "ere it fades and dies," is found in the belief now rapidly spreading that the Karg reservoir has about reached its maximum. The trifles borne on the current serve best to show the direction of the stream, and trifles from Pittsburgh, as also along the Ohio territory, go to show, in a manner quite positive, that the time for husbanding nature's bountiful fuel is measurably close at hand. In connection with this topic we note that Mr. E. B. Philipp, of Findlay, is down for some remarks on natural gas; and although the title of his paper certainly affords no clue to the belief that he will discuss the possible longevity of the period when an unrestricted (comparatively) supply of natural gas will be enjoyed, yet many would be gratified were he to look at that phase of his subject. We note another paper, by Mr. F. W. Day, of Columbus, on the "Policy of Gas Companies as to Incandescent Electric Lighting," that will be looked forward to eagerly by many a gas works proprietor outside of the Buckeye State. Here in the East, at least as we understand the drift of sentiment, gas managers are not overenthusiastic on the great profit to be obtained in the supply of incandescent electricity. More prominently than ever the fact stands out that this style of light was exactly located by Mr. Edison by the famous phrase in which he dubbed it the light for the rich man. Unpleasant as the knowledge is, the poor man outnumbers his more fortunate fellow, and while such is the rule—and when shall it cease to be?—we imagine the poor man's light is to be in the ascendant. We cannot blink the fact that the electricians of to-day are the ones who seem most anxious to induce the gas maker to take up the supply of incandescent electricity, and their insinuating advances appear to be chiefly based on the plea that such supply is a most profitable business. Now most people, and particularly those who from their birth have been nurtured in the starry republic, when they possess a good thing are not apt to beg others to share it with them. And gas men have not issued any ardent invitations to the electricians to share in the business of the former. Perhaps it might be well for the gas men to—as Mr. Ridlon, at the late meeting of the New England Association invited them to do—come out of their old-fashioned shells, etc., but before emerging from the old shell and entering into the new one it might be in line of prudence and profit to know quite well that the new structure was at least as likely to protect them from the mildew of loss as did their original covering.

Look where you will at the Association's paper list, you are confronted with a topic sure to be at once interesting and instructive; and it is with pleasure we anticipate the time when our ears shall be greeted by the sounds of the fray shortly to be initiated in the Sloane House at Sandusky.

SOME RECENT GAS LITERATURE.

We are indebted to Mr. W. J. Johnstone, Chief Inspector of Canadian gas and meter standards, for a copy of the "Canadian Gas Inspection Act, and Instructions," a copy of which work is presumed to be the guide of the sub-inspectors, of whom there are 20 in the province. The volume contains minute and well prepared rules for the inspection and testing of meters, the estimation of candle power, and the examination and detection of an undue content of impurity in gas supplied. The volume is published by Messrs. MacLean, Roger & Co., Wellington street, Ottawa, which firm, we presume, is the official printer for the Government.

Another specimen of gas literature comes to us in the shape of an article, entitled "The Fire Risks of Gas Works," now being published in the *American Exchange and Review*, of Phila., Pa. This paper—a leading American insurance monthly journal—is usually remarkable for the sterling value of the matter it prints; but this time, having stepped somewhat outside of its normal line, it has been sadly bamboozled by somebody whose name is unknown to us. Were we in possession of the name we would certainly give it especial prominence. The article is published in "Two Parts," the first of which appeared in the February issue of the *Exchange*, etc., and any gas man who wishes to indulge in a hearty laugh ought to purchase the "series." Here is a passage or two taken at random from it—in estimating the "fire risks" the author found it necessary to refer at length to the operation of gas making:

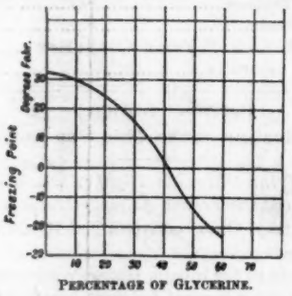
"Much the greatest quantity of gas for illumination, also for heat and power, is obtained through destructive distillation of bituminous coals. Retorts of cast iron or of fireclay, their oval section about 20 by 15 inches and length 7 feet, are set in firebrick, in threes, fives, etc., up to 10, within a furnace burning coke. This is the most economical fuel, and usually one-third of the coke made in distillation suffices, the balance being sold. When the retort is two-thirds filled with coal (charge about 160 lbs. weight), the plate covering the front is luted, and fastened by a central screw working in an iron arch; and sometimes the fit is tight enough to dispense with the troublesome clay and lime luting. If the retort be of iron, the coke furnace fire is urged to 1,996° F. (melting point of copper), or to 2,010°, a dull orange color; if the retort be of fireclay the temperature should reach 2,370° F., or white heat; the duration of the distillation is 4 to 6½ days. During this time the actual temperature the coal receives is 1,500° to 1,600° F., some heat being lost and much absorbed and carried off by the aqueous vapor of the coal—the latter occurring especially in the earlier part of the process. It is also an ascertained fact, that intense as the heat is in the retort, it penetrates rather slowly into the caked mass, as can be shown by heating a moderate quantity of such to redness on the outside, when the interior will be found to be scarcely warm, and perhaps moist. The gas delivered during the first hour has a temperature of only about 160° F. Afterwards the coke commences to boil, emitting gas in bubbles (which accounts for the spongy appearance of coke), and the temperature of the gas rises rapidly.

"The degree of heat in this process is of much importance, for, if too low, less gas and a great quantity of tar will be produced; if the temperature be too high a portion of the hydro-carbons in the gas will be decomposed, and their carbon deposited within the retorts, thus making gas of poor quality. If the time be too protracted sulphur will become largely combined with the coke, making the latter of much less value as a residuary product. As it has been found that the gas passing over the last 36 hours is of much poorer quality, the time is now generally shortened to 5 or even 4½ days, improving thus both gas and coke. It is also said that at the last stage of the process, when too long continued, carbon di-sulphide is formed, which is a most objectionable impurity, and difficult to eliminate."

The above is by no means the most ludicrous sample which could be given, yet it is sufficiently "funny," we imagine. If it were not for the danger that some amateur might therefrom receive his first impressions concerning gas manufacture, the *Exchange's* "serial, in two parts," would have no serious side at all.

The Freezing Point of Glycerine and Water.

In the course of investigation to obtain a mixture which would be noncorrosive to brass and iron, and not freeze above a certain temperature, experiments on solutions of glycerine and water were tried for the purpose. The methods used consisted in making up a freezing mixture of various salts with broken ice as required for the purpose, and placing in them large test tubes filled with alcohol. The solution of glycerine and water to be examined was placed in a smaller test tube, which was immersed in the alcohol, and the temperature of its freezing point carefully



measured by means of standardized alcohol thermometers. The glycerine used was examined for the purpose of confirming the claim of its chemical purity, and distilled water was used. The following results were obtained:

Percentage of Glycerine.	Freezing Point Deg. F.
0	32.
10	29.8
36	9.5
46	9.6
58	—21.5
70	unfrozen at 27.4

These results are shown graphically on the diagram, and also afford a convenient method, by means of interpolation, to determine a solution which shall remain unfrozen at any desired temperature.

[OFFICIAL REPORT.—Concluded from page 148.]

Eighteenth Annual Meeting of the New England Association of Gas Engineers.

HELD AT THE PARKER HOUSE, BOSTON, MASS., FEB. 15 AND 16, 1888.

SECOND DAY—MORNING SESSION—FEB. 16.

The Association was called to order at 10 A.M. The President announced that the morning's business would be introduced by the reading of a

REPORT FROM COMMITTEE ON CANDLE POWER AND ILLUMINATION.

Mr. Taber, on behalf of the Committee, said:

The Committee to whom was referred the matter of photometric work would report that they have given some attention to this subject, and would request the favor of the Association that they be allowed further time. It was the original purpose of the Committee, first, if possible, by simultaneous comparison with a common gas flame, say in a standard Argand, to determine some definite unit of comparison which should furnish true measures in the values of light emitted from varying gases as well as other sources of light; and thence, secondly, the value of different colored flames and different-sized areas of illumination. In other words: First, to find a unit by which to express the value of any light; and, secondly, the values themselves of differently-colored flames and differently-sized areas.

And right here it becomes necessary to define the idea of the unit, which might be either a handy unit of comparative measurement, or the absolute unit, which might be legalized. If the first, which after all might prove of the first importance to the gas maker, an error of 5 per cent. in any reading might prove of little value—if only we can obtain the value of a light promptly and readily; while for the second or absolute value, some unit, even if obtained at greater expense of time and care, must be such that it can be depended on to give one result under the same conditions; and these conditions must be at the will of the operator, and be capable of repetition at any time. Thus, for instance, a jet photometer or a burning candle might serve as good examples of the first class for handy comparative standards of light, while some other source of light, say a fixed diluted gas, or even a section of a gas flame, or the French fused platinum standard, may prove examples of the second.

In this preliminary work of the past year your Committee have, therefore, been endeavoring, by comparative observations of such instruments as they could obtain, to define for themselves what was and what was not wanted as a unit of light for these two purposes.

On entering the field, then, we found it already occupied by the active efforts of Mr. Dibdin, Secretary to the Metropolitan Board of Works, who had made a partial report to his Board of the comparative value of the standards of light suggested in England, France, and Germany, and who very kindly furnished us with the results of his labors up to that time. Through his advice your Committee ordered, of Messrs. Woodhouse & Rawson, the new Pentane Lamp they were bringing out, to make more practicable as well as portable the pentane air standard of Mr. Vernon Harcourt. In due time, late in the fall, the lamp was received. Meanwhile, with two jet photometers received from Mr. E. C. Jones, and presented by him to the Association, simultaneous bar and jet observations were taken daily at the office and works—the two jets having been thoroughly tested together for comparative results. Through the kindness of Mr. Greenough, of the Boston Gas Light Company, a Methven slit was also loaned your Committee, and some few comparative tests were made with this against the candle, and also against the same size of slit in different parts of an ordinary Argand flame; and with these instruments and candles your Committee have endeavored to feel their way.

A second printed report from Mr. Dibdin, more exhaustive than your Committee can hope to verify, was received, giving the results on his four-way photometer; and perhaps your Committee might have felt the ground already so well covered that it were useless to follow further, and better, perhaps, to adopt his conclusions *in toto;* but we have thought it better, before recommending such a course, to thoroughly satisfy ourselves of the accuracy of the pentane standard—its amenity to established conditions—before we ventured further. For this purpose, without prejudging our case, we ask for further time.

Our own experiments might be readily summarized: 297 readings were made of the Jones jet photometer simultaneous with observations of the bar, using as comparison a Sugg's D-Argand and candles obtained of Mr. Tufts. This so-called photometer, which in reality is only one of the type of the Kirkham and Sugg jet and of the French rheometer, and can only by courtesy be called a standard of light, since it is in reality dependent mainly on the specific gravity of the gases, is yet most convenient and handy. Our purpose was to ascertain (1st) its reliability as compared with the bar; (2d) its power of recording differences in gas. The mean of its readings will answer the first question; their variation the second.

Comparing it, then, with candles burning correctly, we find the mean of four month's reading by the bar to have been 17.4; by jet, 17.3. And also during the same period, in 297 observations, we find

16 were coincident with the bar reading.
117 were within .5 candle either way.
234 were within 1 candle either way.

of 88 of which, 48 were slow, the balance being fast—very satisfactory results, within these limits, for a ready and convenient system of comparing lights.

And just here we began to discover the difficulties of photometric work. It was easy enough to obtain a standard burner (Sugg's Argand, D)—any one of a number chosen at will and tested against another would give equal results, and a clock meter, of the Goodwin Company, could, with a Tuft governor, be so easily graduated that exactly the proper amount of gas would pass in exactly the proper time; but when you approach the candle end of the photometer both scales and candle vie apparently in unreliability. The candles themselves vary. Of three different candles obtained from three different sources—

No. 1 had 54 strands; sp. gr., 9723; with commercial c. p. of gas, 18.000
No. 2 " 60 " " 9688; " " " " 19.618
No. 3 " 74 " " 9706; " " " " 19.828

while the consumption of sperm, in 402 observations, varied as follows:

In 202 observations, 20 grains.
In 108 observations, were within 5 per cent. either way.
In 200 observations, were within 10 per cent. either way.

All others were rejected. The law of compensation for this error appears empirical—some comparisons obtained with a Methven slit appearing to indicate that the common method is incorrect; but your Committee do not feel justified, because of the limited number of observations, in more than indicating this fact.

Another deduction from these observations seems to point to the fact that the candle, even in a photometer box 22×18—double the size used by the State Gas Inspector—consumes faster than in the open air. The results we obtain are as follows:

In the closed photometer box.—151 were correct, 16 were short in consumption, 90 burned in excess.

In the dark room.—51 were correct, 75 were short in consumption, 19 burned in excess.

We must, therefore, conceive, then, of a candle as a small gas works in a remote town situated some distance from a source of supply, and using bituminous or gas coal indiscriminately; while, if you will pardon the image, the wicked manager, either standing erect or reclining in any direction, is evidently careless of his candle power, and entirely oblivious of the error in his meter, the scales.

The results of these two standards, the jet and the candle bar, show them to be easy, handy, and good ready-reckoners as units of light; but unreliable for exact determinations and unfit for legalized standard work.

Further examinations now must be continued on the Methven slit, the pentane lamp, the amyl-acetate lamp, the incandescent lamp, and the platinum standard; and these your Committee have somewhat attempted, but do not feel warranted in expressing their results at this stage.

We leave to the Association to point out to us the directions in which our labors should tend—if we have not grasped their idea of our duty; and shall hope another year to make a more comprehensive report on what may be, as in this sketch we have shown what may not be, a legalized unit of light.

[Mr. Taber here read the following extracts from the report of Mr. W. J. Dibdin, Chemist and Superintending Gas Examiner to the Metropolitan Board of Works, London, England, on the proposed English standard of light.]

"As will be seen from the tabulated results of the numerous experiments which have been made—viz., 2,120, involving over 20,000 recorded observations—candles, as the only legal standard in this country, have been systematically used with the result of still more than ever proving their unreliability. The Keate's lamp has been tried most thoroughly, but has failed in practice to realize all that was formerly hoped from it, not so much from any inherent defect as from the severe trial it makes, as compared with other systems, upon the patience of the observer. On

the other hand the pentane air gas has completely borne out my former experience of it; while the improved form of pentane lamp has worked very satisfactorily. The Methven slotted screen, with carburetted gas, has given very good results, and is undoubtedly an admirable working instrument when carefully used. The 'ten-candle test' of Mr. Sugg has afforded most excellent results, but it is vitiated by the same fault as the original Methven, in that it depends upon the ordinary supply of coal gas, which, in my opinion, cannot be accepted as a standard combustible."

* * * * * * *

"In selecting a substitute for the present legal candle, care should be exercised to insure that it complies with the three main conditions which apply to the present standard, viz.:

"1. That it should have a definite combustible material.

"2. That the condition in which that combustible material exists at the time of use should be under control and capable of inspection for verification.

"3. That the rate of combustion, and the manner in which it is effected, should be readily and accurately observed.

"By applying these considerations to each of the proposed standards, a guide is at once obtained for the selection of the most suitable.

"The pentane air gas, as devised by Mr. Vernon Harcourt, the Keates lamp, and the amyl-acetate flame of Herr von Hefner-Alteneck, all answer to the requirements of these conditions; while the Methven screen, the pentane lamp, the ten candle test, and its improved form, which I have called the 'pentane Argand,' although each giving most excellent results in practice, fail to comply with these requirements, as they each depend upon a purely arbitrary rate of consumption of combustible material, coupled with a definite height of flame; but no check is afforded by means of which an involuntary error in the setting of the flame by the observer can be afterward detected."

* * * * * * *

Mr. Dibdin says of the pentane lamp purchased for the Association by us: "This observation also applies to the pentane lamp, which affords a flame of precisely similar character to that of the pentane air gas. The improved pattern of this lamp, which is in no way altered as regards the principle of its operation, but is improved merely in matters of detail and adjustment, has afforded remarkably good results, and when it is properly working gives results identical with the air gas flame."

* * * * * * *

In concluding, Mr. Dibdin says:

"In view of the unmistakable results of the exhaustive series of tests conducted during this inquiry, I recommend that the Committee do advise the Board to forthwith take such action as may be necessary to secure the adoption, with as little delay as possible, of the pentane air gas standard as devised by Mr. A. Vernon Harcourt, F.R.S., etc., as the legal standard of light in this country. As, however, many practical photometrists are of opinion that a standard of light of more than one candle is desirable for many purposes, I further recommend that when the legal substitution of the pentane unit for the present candle be made, the Board of Trade should be empowered to sanction and authorize the use of such other standards and substitutes as that Board may deem fit and proper to be used in place of, and after comparison with the pentane air gas flame."

* * * * * * *

"Table showing the total number of tests made, and the total and percentage numbers within 1 per cent. of the mean (exclusive of those given in the first report):

Standard.	Total No. of Tests.	No. within 1 per ct. of the Mean.	Percentage No. within 1 per ct. of the Mean.
Candles	454	154	34
Keates' lamp	244	98	39
Pentane	468	373	80
Methven	283	211	74
Ten-candle test	49	43	88
Pentane Argand	243	212	87
Amyl-acetate	226	200	90
Pentane lamp	154	150	97
Total	2,120		

In further explanation Mr. Taber said: We have also brought in this morning, as some of you have been informed by your nôses, the pentane lamp belonging to the Association, and also the Methven slit, kindly loaned to us by the Boston Gas Light Company. I do not know that we have already occupied more time than we ought for this imperfect report, but the further I go in the business, the more I become satisfied that I am not adapted for this class of work. I thought I knew something about photometry before, but do not think so now. In fact, if you will appoint another committee I will resign with pleasure. I have been much interested in this lamp, although as yet, either through our method of distilling the pentane, or for other cause, we have not obtained the results gained by others. However, Mr. Dibdin acknowledges that his early attempts with the flame were not satisfactory. Perhaps the failure is as much due to the imperfections of the observer as to anything else; but one noticeable thing in connection with it is, that the results are almost exactly alike, right along. There is no variation, as is the case with candles—candles are not to be compared in this respect; but that pentane lamp will burn exactly the same, right along hour after hour. I am much more pleased with its operation than I am with the lamp itself, which is decidedly cumbersome. The idea of the lamp is this: The pentane is poured into this upper vessel, and allowed to drop, by a method easily controlled by a thumb-screw, into this receptacle, from whence it flows into the vessel set in this cylinder, the latter being heated by this little fan, which carries a trifle of heat to this cylinder. As pentane is very volatile, it is driven off just as the naphthaline is in our ordinary naphthaline lamps. The gas is forced down, then brought up here, and burned. By sighting along you obtain a sight through these side openings, either with or without a chimney. A little variation must be allowed if a chimney is used. The flame can thus be kept at a constant height. The supply of oil is easily regulated by the thumb-screw on the box holding the water, which drives the pentane up and down in this tube. The chief objection to it is, that it is difficult to handle in some respects. However, as far as I have gone, I am very well satisfied with the results.

Mr. Greenough—What was the cost of that outfit?

Mr. Taber—It cost ten pounds in London, or about $88 here.

Mr. Coggeshall—What is the size of the flame now as compared with a candle?

Mr. Taber—It is intended to be one candle, when set at the proper height.

Mr. Nettleton—Where do you obtain the material?

Mr. Taber—From the distillation of naphtha. It is very easily obtained by distilling all that will come over between 35° and 50° C., and then re-distilling between 35° and 45°.

The President—You have heard the report of your Committee, and the explanation which Mr. Taber has given. It will be in order to vote that they have an extension of time, according to their request.

Mr. Stiness—I move the Committee be requested to continue their experiments in any line they may see fit, and that the thanks of the Association be tendered to the Committee for their progress thus far. I do not wish to limit them in any respect. They state they wish some limitation put on their investigation—or rather, to receive instructions from the Association; but I do not think the Convention as a body is capable of instructing them in that line. They have certainly given us a very able and a very instructive report.

The President—You have heard the motion of Mr. Stiness. According to the report of our Treasurer, we have nearly $1,000 on hand; and the vote which Mr. Stiness proposes does not put any restriction upon the operation of the Committee, or in the way of expenditures, although I suppose they would not be authorized to mortgage the Association financially. I think, with the Treasurer that we have, and with the new management that is coming in, the funds in hand will be well taken care of, and that, therefore, you need have no hesitation in voting for the resolution offered by Mr. Stiness. Of course, we understand his motion to include also the thanks of the Association to the Committee for what they have accomplished thus far.

The motion of Mr. Stiness was agreed to.

Mr. Taber—I accept the thanks of the Association, and also accept your vote. As the matter now really goes into Mr. Prichard's hands, I feel very much honored. I withdraw in favor of Mr. Prichard.

Committee on Memorial.

Mr. Slater—It would seem fitting and proper that some tribute of respect should be paid to the memory of our deceased member, Mr. David Brayton. I was not acquainted with him, but as Messrs. Taber and Leach knew him very well I, therefore, move they be appointed a Committee to prepare a minute to be spread upon the record. (Agreed to.)

An Invitation from Mr. Ridlon.

The President—Mr. Ridlon, to whom we had the pleasure of listening for a moment yesterday, desires to say a word to the Association, and we will now give him an opportunity.

Mr. Ridlon—I wish, in behalf of the National Electric Light Association, which holds its convention at Pittsburgh, commencing on Tuesday of next week and continuing on Wednesday and Thursday, to invite this Association to attend that meeting. You can attend it in a body, or

send delegates. I feel, gentlemen, that you should join us in solving this great problem of electricity that we have taken hold of. I feel we should go hand in hand in this matter. Therefore, I would like you to attend our convention, and attend the meeting of our electric clubs, in order that we may divide with you such information as we may obtain from time to time. We look upon you as the future distributors of light, heat, and power among our manufacturing establishments and the industries which circle around the cities, towns, and villages wherein you have your plants. You, with your cheap fuel gas, can easily do this, and can far outstrip anyone else in doing it. We hopefully look forward to the day when, by touching an electric button, we can obtain the supply of light and fuel which you shall furnish, bringing heat into our houses in the winter, and in the summer furnishing us the means also of cooling our rooms; also furnishing the power for supplying, 10 miles away from our stations, even so small a quantity as one-fourth horse power, which will be utilized in forcing fresh air into our houses, and giving proper ventilation. We can run our family sewing machine with it, clean the knives and forks, rock the cradle, and spank the eldest child. I hope, gentlemen, you will join hands with us in our endeavors, and that we may mingle together as in a common enterprise. I ask you to come out of the shell of the past, and take up with the new and modern methods for furnishing light, heat and power to the world.

On motion of Mr. Slater the invitation of Mr. Ridlon was accepted, with the thanks of the Association.

THE QUESTION BOX.

The President—One more paper (that prepared by Mr. Gerdenier, of Bridgeport, Conn., on his experience with tar, etc.) is yet to be read, but before listening to it we will take up some of the questions which have been placed in the question-box. The reading of the paper is delayed because, on account of the unavoidable absence of its author, we wish Mr. Page to be with us during the discussion. Mr. Page knows all about the "Walker Tar Extractor," which proved so beneficial in the Bridgeport works, and it will be well for us to have the benefit of Mr. Page's experience. The first question in the box is—

"*Will lime that has been slacked one year purify as much gas per bushel as lime that is freshly slacked?*"

I think Mr. Hallett, of Springfield, can tell us a good deal about this.

Mr. Hallett—I have had no experience with lime that has been slacked a year, for we use up our lime a little closer than that. We obtained very good results from freshly slacked lime in the last few years, but have not had any experience which enables us to give the amount of gas that can be purified with lime which has laid over for a year.

The President—What kind of coal do you use?

Mr. Hallett—We use Youghiogheny coal, and about 5 to 7 per cent. of cannel of different kinds. That is the style of mixture we used last year. More recently we have been enriching with crude oil. We get the same results in purification with the oil that we did before.

The President—Will Mr. Taber add his experience on the subject, for the benefit of the Association, whether lime which has been slacked a year would furnish as much purification as freshly slacked lime?

Mr. Taber—I do not think it would. My idea is that during the course of a year lime would take in sufficient carbonic acid from the air to deteriorate it more or less. Such was my impression when I heard the question read. I would not care to try the experiment.

The President—If any other member possesses any experience in regard to this, will he kindly state it for the benefit of the gentleman who put the question in the box. It is suggested that Mr. Stiness has had a good deal of experience in stopped purifiers and things of that kind, which may have some bearing on the subject. Will he kindly give us the benefit of his experience?

Mr. Stiness—Shall I tell the whole story?

The President—While you are at the confessional you may as well tell the whole story.

Mr. Stiness—Yesterday was Ash Wednesday, and, therefore, this is a very good season to tell the truth and the honest truth; but I believe that occasionally some of us do not tell the whole truth. I have had no experience with regard to slacked lime a year old, but in a letter written to me a short time ago by my friend Nettleton, in which he stated that, as I had had some experience with lime that hardened in purifiers so quickly that there was a purifier in the air all the time, he asked me to tell the whole story. I am not able to say whether it was the result of using freshly-slacked lime or not. My confident belief is that the trouble may be all summed up in one plain and simple word, "Neglect." I most fully believe that in that word is to be found the cause of many of the strange things, seemingly at the time unexplainable, that occur within the domain of a gas works. In the early part of December I purchased about a cargo of eastern lime, and from the time we commenced using it (slacking it instantly, and putting it into the purifiers as soon as possible) the trouble began. From a 4½ inch pressure in the engine room it went to 12, and from 12 it went, before we got through with it, to 18 inches. I made all sorts of experiments. I tried broken coke, coke dust, and, in fact, I thought I would do something after the manner of the old lady who said to the Methodist minister, when she was putting molasses in his tea, and he rather demurred to it, "You may have it all molasses, if you want." I felt a good deal like putting in nothing else than coke. But that did not seem to touch the point. From making 450,000 feet per day I was compelled to drop down to 200,000 feet, without any diminution of the pressure on the purifiers. Finally, along came the Friday morning before Christmas. I had spent the greater part of the week in the purifying house. Every gas holder was down except one, and that was just above water. The sky was leaden with blackness. I said to my foreman, "Plug up every drip"—pardon the expression; but I wrote it to my friend Nettleton—"plug up every drip, and ram the d—n gas through." Under an 18 inch pressure I came out all right with everything, except my pride, and that was severely humbled. I attributed it at first to the use of the freshly-slacked lime, but on a more thorough and perfect examination I found that, in changing the purifiers so often, there was not time to properly clean the trays, which added materially to the back pressure on the purifiers. Putting the lime in so warm formed the carbonate of lime almost instantly. I then telegraphed for a carload of lime, and immediately the difficulty vanished. I have always felt that lime which was slacked a sufficiently long time to be perfectly cool, was much better than lime put into the purifiers fresh and hot; but I would hardly like to keep it a year, on account of the interest. I think the interest would about pay for what lime we use. I have given you a plain and unvarnished tale of an experience of one week, and I never want to have another like it.

Mr. Neal—What was the condition of the lime when the boxes were opened?

Mr. Stiness—It was quite hard. Some of it, although it had not been in there six hours, was in such condition that we were obliged to pry up the trays with hooks to get it out. I put some of the lime out-doors and cooled it, then put it right back in the boxes, and I am now purifying 14,000 feet per bushel with that lime. We were compelled to break it up with hammers after we got it out of doors.

Mr. Slater—I think at one time Mr. Stiness used shavings in the bottoms of the boxes, passing the gas through the shavings first and then over the lime. Was he using shavings at the time he had this trouble?

Mr. Stiness—No; and for the simple reason that after they found out it was a good thing for me to use shavings they put the price up to ten cents per bushel, and so got a corner on me. What I used was not shavings, but maple wood chips from the spool works. I would still use them if I could get them.

The President—I think our Secretary has had a good deal of experience on this subject.

Mr. Nettleton—This matter of stopped purifiers is one in which I have taken a good deal of interest, for the reason that I have been troubled in very much the same way as Mr. Stiness, possibly worse than he. I remember one day when four purifiers were emptied and three filled. It was impossible to get the purifiers changed often enough. Often the gas was blowing out of the purifiers, and it was a question whether enough gas could be forced through to keep the holders up. I got from Mr. Stiness the idea of using the chips. I understood he had used them to help out the lime. I began to use them, to lighten up the lime to prevent the stoppages. Since commencing the use of them we have had absolutely no trouble from stoppages. I do not dare, with the small-sized purifiers that we have, to put in the lime without chips or sawdust, chips being very much better than sawdust. Since that time we have had absolutely no trouble, and have put through more gas to the box this last winter than ever before; and, whereas I expected to be obliged to put in a new set of purifiers this coming summer, I think, thanks to the chips which Mr. Stiness suggested, the purifiers will last for two or three years longer.

The President—How much gas do you purify to the bushel of lime?

Mr. Nettleton—About 7,000 feet to the bushel of oyster shell lime. The bottom tray is mixed—half chips and half lime; the two other trays have one-third chips and two-thirds lime.

Mr. Stiness—I would like to say I have before advocated the use of these chips, and I believe they are a great benefit. There is another matter which I wish to refer to. I have a system of valves in my purifying house, and can work one, two, three or four purifiers at will. It is due to this fact that I was able to supply gas over Christmas. With a center-

seal I could not have done this, and should have been out of gas. I believe the chips are well worthy of the attention of all gas engineers. It gives a chance to lighten up the lime, and you can use the whole of it completely up.

Mr. Taber—With regard to the chips, I would like Mr. Stiness to specify what kind of chips he prefers. In New Bedford we tried to use fine chips, or fine shavings in the purifiers, but later on we sent out all over town to get them out of the burners. They seemed to clog up everything.

The President—We are favored with the presence of Mr. Leonard, of Portland, Oregon, who has had quite an extensive experience on this subject of purification by copperas and lime. I know the Association will be very much gratified if he will kindly give us the benefit of his experience in that particular. I take great pleasure in introducing Mr. Leonard to the Association.

Mr. Leonard—It is rather an unexpected honor to be called upon in this way, and it is rather an anomaly for a man from Oregon to stand up before such an audience as this in an attempt to give any ideas about purification. I suppose I am called upon in this way because I casually mentioned to my friend Stanley about our mode of purifying gas. We use copperas and shavings, with a very small amount of lime. We have been using this since the beginning of the winter of 1886. We got the idea from our former engineer, Homer Bloomfield, who wrote us from California suggesting this plan. We concluded to adopt it, and made preparations. He advised us to start with about 100 barrels of copperas. In endeavoring to ascertain where we could obtain the copperas cheapest we found that the Cleveland (Ohio) Rolling Mills was the place to purchase it. If I recollect aright it cost us about 65 or 75 cents per cwt. We ordered 100 barrels, or 15 tons; say, one car load. By the time our copperas arrived we had prepared the shavings according to Mr. Bloomfield's formula. They were not ribbon shavings but were borings principally and coarse shavings from the planing mill. We had them thoroughly dried, so they would absorb all the copperas possible. To use the copperas we diluted it with hot water. We filled a cask one-half or two-thirds full of water, then began to shovel in the copperas and let on the steam. The copperas dissolved very rapidly, or as quickly as it touched the hot water. We had shavings enough laid out on our lime room floor for one purifier Our purifiers are 17 x 20. We commenced upon one side of the room and sprinkled the shavings with a hand sprinkler until they were thoroughly saturated, and then had them turned over and resprinkled. We continued that until those shavings had all the copperas that they would take. We then took one set of trays from the purifiers and laid the shavings on the bottom shelf. Then we laid on four barrels of slacked lime to the depth of 4 inches. On top of this we put the rest of the trays, and then wheeled our material right in on wheelbarrows, and dumped it in until we filled the box full. Then we put the cover on and went to work.

Mr. Neal—How many inches in depth?

Mr. Leonard—Probably about 30 inches. We found that it worked. At first we were a little bothered. We examined the trays in about a week and found they did not color as we thought they ought to. Then we removed them, sprinkled a barrel of slacked lime through that mass, and put them back again. When we took them out again we found they had worked as Mr. Bloomfield said they would; they came out then very much discolored. They went in a brown color, but came out quite dark, nearly black. We went on with that until all the purifiers were filled with this material. We run now on that mixture principally, and have ever since. We lift our purifier covers twice a month. We have run on that same lot of shavings, with the addition that every time we change we dilute about a barrel of the copperas and resprinkle the shavings as they come out. They come out quite dark colored, and after remaining for two weeks on the floor, and being turned every day or two, to expose them to the air and give them a chance to be revivified, they get back to the brown color, when we put them back in again. Of course, from handling these shavings so long they become somewhat broken, and the boxes were not filled as full when they went back a second time as was the case at first. Now they lack about six inches of being filled. Last fall we treated a wagon load of fresh shavings in order to loosen them up. They had become fine and we were afraid there might be some back-pressure of gas. Now, every time we change the purifiers we put on about a barrel of these shavings saturated with copperas. The last letter I had from home stated they ran through 3,900,000 feet of gas on one charge. You know as well as I do about how long that copperas will last and how long it will hold its virtue; but, as I have said, we have used the same shavings now for two years, and have found the result to be very satisfactory.

The President—I would like to ask Mr. Leonard in what condition he finds the lime that he puts in the bottom of the trays?

Mr. Leonard—We find the lime to be in the same condition that the lime was when we purified entirely with lime. We use eight barrels of lime per month now. In 1885 we ran exclusively on lime—mixing up the lime with coarse sawdust, however, as we had done for years. In 1885 we used 1,062 barrels of lime in our works for purifying 45,000,000 feet of gas, at a cost of $1,824. In 1887 we used 108 barrels of lime and $59.77 worth of copperas, and purified 51,482,000 feet of gas, the total cost for 1887 being $222 for material, as against $1,824.30, with lime, for 1885.

Mr. Cabot—What is the cost of lime per bushel with you?

Mr. Leonard—It costs us $1.50 per barrel, unslacked.

Mr. Neal—Is there an official inspection of gas in your State?

Mr. Leonard—No, there never has been.

Mr. Neal—Of course you have no sulphuretted hydrogen in your gas?

Mr. Leonard—No.

Mr. Neal—And no sulphur?

Mr. Leonard—Very little.

Mr. Neal—Nor any carbonic acid?

Mr. Leonard—No. We make a pretty fair gas, say of 20 candle power—that is, we aim to. The coal from which we make our gas has very little sulphur in it. It is Australian coal.

The President—What difference is there in your labor account?

Mr. Leonard—Very much. As we are now making gas, we only lift a purifier cover once in two weeks. We save all the labor of handling and slacking so much lime, and getting rid of so much waste lime. We also save a very large amount in the use of the sieves, which are expensive. We now have sieves enough to last us for 15 years, without buying any new ones, because we now use only two tiers of sieves as against six formerly.

The President—Are there any further questions on this subject to be asked Mr. Leonard. I think the members all feel under special obligation to our friend Stanley for giving us the pleasure of hearing Mr. Leonard on this occasion, as we are also under obligation to Mr. Leonard for his interesting and valuable experience. We will consider the question of purification as having been answered, and will take up the next, which is,

"*With the exhauster working at zero, why should the gas come back through bridge and stand-pipes, with a seal of 3½ inches on the hydraulic main?*"

Mr. Allyn—It seems to me, in order to understand and answer this question, we should first be informed of the location of the different parts of the apparatus. Certainly we ought to be informed where the exhauster is located. If the condensers and scrubbers are located between the exhauster and hydraulic main, that would occasion some obstruction either in the condensers or scrubbers. On the other hand, if the exhauster comes next to the hydraulic main, it would seem as if the connecting pipes were either too small in capacity, or else there was some local stoppage. We can hardly consider the matter understandingly without knowing the location of the different parts of the apparatus.

Mr. Wood—If the exhauster is drawing directly from the hydraulic main, there generally is from 50 to 75 feet of pipe between the exhauster and the main, and there must be a stoppage of that pipe.

Mr. Prichard—If the pressure is taken on the hydraulic main, I can see no possible reason why it should go back; but if the pressure is taken at the suction end of the exhauster, it must show a stoppage between the exhauster and the hydraulic main.

The President—I am sorry the gentleman did not state all the conditions as Mr. Allyn suggests; but if he will kindly do it now we will have this question solved.

Mr. Leach—I asked that question. The exhauster is between the hydraulic main and the condenser, and is about 35 feet distant from the hydraulic main. There is no stoppage in that pipe. I am confident of that. Our seal is now up to 3½ inches, and we cannot run it with any less. Is not the cause of it the vibration of the water in the main?

Mr. Greenough—I think the question asked by Mr. Leach is a pertinent one. I may say we have been led to believe, from the running of our works at Commercial Point, that the difficulty we had there with stopped stand-pipes came from that cause—the vibration of the water in the main; and by increasing the seal we have largely done away with the stopping of the stand-pipes in our new station. We had, as we thought, put in everything possible to guard against the difficulty. We have a very large hydraulic main, and we have an arrangement on the back of the main by which the pitch can be taken out. We gradually increased our seal until we got it up to over 3 inches, yet, once in a while, we get some lampblack in the stand-pipes. We are inclined to believe that the presence of lampblack indicates the presence of air. We find

the vibration on this large main a great deal more than the vibration on the small mains which we have in our North End works. We will stop the stand-pipes in the new works when making less gas to the pound of coal, when we do not stop the stand-pipes in the old works with a considerably larger make of gas. I think the difference is entirely due to the vioration of the main. If I were in Mr. Leach's place I would put a pressure gauge on the hydraulic main and see what is going on there.

The President—The next question is—

"*Is it safe to make the mouthpiece joint to the stand-pipe before starting a fire in the bench?*"

Mr. Anderson—I should say no, I do not think it is safe to do it. I think it is better to make the mouthpiece joint to the stand-pipe after starting the fire, for the simple reason that the expansion and contraction which takes place is liable either to break the end of your retort, as it did in one case of that kind which I had, or else break some of the castings.

Mr. Jones—What did Mr. Anderson use for making that joint?

Mr. Anderson—I used stone lime, unslacked.

Mr. Jenks—I was about to ask that same question. It strikes me that in slowly heating the bench possibly that condition might take place in using stone lime. It might slack so fast that the joint would become set before the expansion had ceased; otherwise I fail to see how it could take place.

Mr. Allyn—At Cambridge we invariably make all our joints when we put the retorts in, and have never had any difficulty.

The President—What do you make the joints of?

Mr. Allyn—Of lime, usually mixed with very little iron borings and some sal-ammonia. The latter oxidizes the iron; and, after it is thoroughly set, makes a permanent joint. Sometimes, when a bench had been standing for a long time before having had an occasion to fire it up, there would be slight indication of a leak when the gas making first commenced; but it would stop almost immediately.

Mr. Neal—We pursue the same course, and without any bad results whatever.

Mr. Coffin—We use a solution of asbestos, diluted to the consistency of whitewash, with which we treat ordinary yarn, caulking in the yarn and tapping it down lightly. When the benches have been fired two or three days we finish making the joint. I find it quite hard to make a joint unless you do something of that kind beforehand. That solution of asbestos keeps the yarn from burning, and it is a little more comfortable to make it then than it is after the bench is heated.

The President—The next query is this—

"*How will the gas engine work to supply power for an electric light plant? How does it compare in economy with a steam engine?*"

Mr. Norton—I was in hopes that I could have spoken intelligently on this subject, but we have been delayed in getting our gas engine in operation. Since it was started we have not had time to get at the figures showing the cost; but I can tell how much gas it takes to run it. We have a 15 horse power Otto engine, which we started some two weeks ago. In the first place I would say, from the moment we started it, the lights burned very steadily, and have all the time. We have ten lights on it. They are the steadiest arc lights that I ever saw. Probably it will not carry ten lights as cheaply as a smaller engine with the same number of lights; but it now runs ten full arc lights, and uses 275 feet of gas per hour, with the lights all on. With the engine running alone it takes 115 feet. The longest that we have run it at one time is six hours, without variation. Our dynamo produces a 9.6 Amperes current.

Mr. Coggeshall—How many arc lights do you think you can run with it?

Mr. Norton—I think it will run 15.

The President—Whose make of lamp?

Mr. Norton—We have the American.

The President—It takes 275 feet per hour to run ten lamps, and 115 feet to run the machinery, so that it takes 160 additional feet to do the work. That is, it requires 160 feet of gas to run the dynamo when ten arc lamps are lighted?

Mr. Coggeshall—Do you run the dynamo direct from the engine?

Mr. Norton—We run it from a countershaft. The speed of the engine is 120 revolutions, and of the dynamo about 1,000.

Mr. Nettleton—Could you not run directly from the engine and save the countershaft?

Mr. Norton—We thought it better to do it this way. We tried the engine alone at first, and then put the belt on the countershaft, but found no perceptible, or very little difference.

Mr. Prichard—I have paid considerable attention to the running of the Otto gas engine in a general way, but not for producing electric light. It struck me, as Mr. Norton has stated, that the steadiness and reliability of the engine for running the electric light lamp has been thoroughly demonstrated. Mr. Norton states that he uses 275 feet of gas to run ten lights an hour. At the price they sell gas at, I presume it does not cost Mr. Norton more than 40 cents per thousand to put that gas in the holder. Two hundred and seventy-five feet, at that price, would be 11 cents per hour. That is, it would be 1.1 cent per horse power per hour, assuming it takes one horse power per light. I think it would be difficult to find a steam engine running so small a plant which would work down to four pounds of coal per horse power per hour, considering the conditions under which they run. Considering the coal that is used to bank the fires to keep them, and the quantity used in starting the fire, I think it is doubtful if the average of the electric light plants will run on less than six pounds of coal per horse power per hour. But, for the sake of comparing with Mr. Norton's figures, let us take four pounds of coal per horse power per hour. Figuring that out at $4.50 per ton, we have the result of one cent per horse power per hour. Mr. Norton figures the gas at 40 cents per thousand, bringing it down to 1.1, which gives us .1 of a cent difference in just this simple case, and we have still to allow for the cost of water for the boiler, and for the labor of firing. The actual expense, as I believe they figured it, is 1.1 cent per hour. In that case, then, we have the cost identical—whether he runs with the gas engine and uses gas at first cost, or uses a steam engine with coal at $4.50 per ton. This shows to me that we are able, even at the present time, with a gas engine to compete with the steam engine for power; and it seems to me, with increased resources, and the possibility of cheap fuel gas to supply our gas engines in the future, the steam engine has got to go for running electric light plants.

Mr. Norton—We would call our gas 60 cents per thousand in the holder, while the coal would cost $5.50 per ton.

Mr. Stiness—In September, 1887, I first went to Spencer, Mass., to see the electric plant in operation there, where they were running three 15-horse power gas engines. I think the engines were specially made for that work—with large driving-wheels—and 63 Ball arc lights were being maintained by them. I had a large amount of data on the subject, but have not got it with me. I was there one night, and must say I was more than enthusiastic over the results that I saw at Spencer in the running of an arc light plant by a gas engine. On the night that I was there three engines were connected to one countershaft, and from this dynamos were belted. The consumption of gas was very near what the Otto engines are reputed to take per horse power—that is, 21 feet per hour per horse power. The light was very steady indeed. While I have the American system myself, I must say I thought the Ball system was equal in the regularity of the light to anything I had seen. I believe that, while perhaps I would not go to the extent of 300-horse power gas engines, there is a future for gas engines running 100 to 200-light plants. One man had entire charge of the dynamos and engine, and he said that he had nothing to do. I was in the dynamo room for nearly two hours, and he was simply walking around feeling the bearings of the dynamo and engine. He literally had nothing to do. He stayed there from the time he lighted up until 10 o'clock at night. I believe there is a future for gas engines in running electric light plants.

The President—The next question is—

"*Can any member suggest a simple and practical preventive or remedy for the accumulation of solid matter in the outlet pipes of scrubbers and condensers?*"

Mr. E. C. Jones—Perhaps I can help the writer of that question out of his difficulty. Some time ago we had a great deal of trouble from stoppages in the overflows of our scrubbers and condensers. I made an examination of the water that we were using for scrubbing our gas, and found it to be very hard; that is, it contained lime and magnesia. I also made an examination of the hard, black substance which stopped the drip-pipes from the scrubber, and found it to contain lime in large quantities. At that time we were using artesian well water, and bringing it in contact with the gas. I made tests at the same time of our Boston water supply, and, finding that it contained but very little calcium carbonate, we decided we would have to change from the artesian well water—which cost us practically nothing—to the city water in order to get over the difficulty. We made the change, and since then have had no trouble from stoppages in the outlet of our condenser and scrubber where we bring the water in contact with the gas. We found that the carbonic acid in the gas precipitated the lime in the water; and that, in combination with tar and oily matter in the gas, formed a very hard, insoluble, black substance which we have had to cut out at times. I have had 3-inch pipes stopped so solidly with it that we would have to throw

the pipe away. It was practically useless because we could not get the substance out of it.

Mr. Allyn—I plead guilty to being the father of that question. We have had a great deal of difficulty at Cambridge from this source of trouble, and have been unable to find any remedy except the one suggested by Mr. Jones—to take the pipes out, throw them away, and put in a new set. The deposit which forms seems to be almost as hard as the iron itself. It commences as a film on the bottom of the pipe, and keeps gradually increasing until it closes up the whole orifice. We use water from an artesian well, which is quite strongly impregnated with magnesia and lime; and I have attributed most of the trouble to that. Having an idea that, a number of years ago, Col. Armington, in reading a paper before some Association, suggested a remedy for this trouble, I hoped he might be here to-day to answer this question. It was my purpose in asking the question to get him to offer some remedial suggestions.

The Last Paper.

The President—But one other paper remains to be considered, which is that prepared by Mr. Gerdenier, of Bridgeport, Conn. As Mr. Gerdenier has forwarded the paper to the Association with the statement that he cannot be here to read it, I may say I do not know of anyone else who is so well fitted in every respect to take Mr. Gerdenier's place in this matter than our friend, Mr. Geo. Shepard Page. He is familiar with the "Walker Tar Extractor," and knows all about it, so I will ask Mr. Page to read the paper, and then to put himself in Mr. Gerdenier's place and be at the mercy of the members of the Association when they place him on the rack.

Mr. Page, in response to the invitation, then read the paper, by Mr. Gerdenier, of Bridgeport, Conn., entitled—

MY EXPERIENCE WITH COAL TAR, AND THE WALKER TAR EXTRACTOR.

Many of my friends are aware that I have suffered for years with the tar difficulty. I not only found it in abundance in my drips, but it filled up my tower scrubber, gave me a great deal of trouble in my "Standard" washer-scrubber, and, in conjunction with naphthaline, filled solidly a 12-inch main. It was always present in my purifiers.

This difficulty existed for many years, when I was manufacturing gas under the ordinary system of firing retorts; but when I introduced regenerative benches my previous troubles were nothing to what I then experienced. Night after night I remained at the works, clearing out, first, this connection, and then that apparatus. I tried every device I could learn of by reading or by correspondence. I introduced a hot scrubber, which seemed to promise speedy relief, but the tar question was only aggravated. The black devil became worse than ever. He was always present before me in his worst shapes when I was awake and in the works. I dreamed of him whenever I slept—and I did not sleep much.

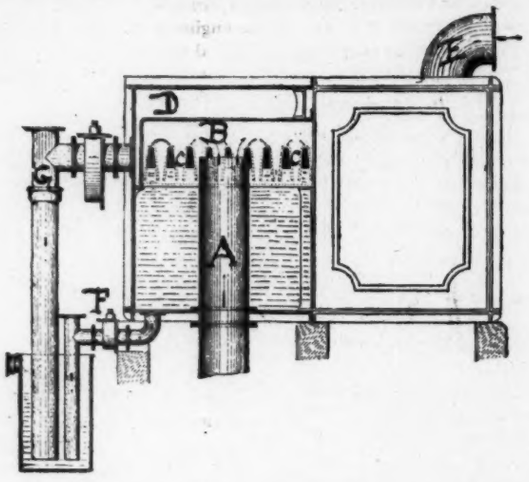
In all seriousness, so greatly troubled was I with the incubus, tar, that it was the principal cause of a serious illness.

Instead of finding comfort and ease with my modern improvements, the experience of the six months after their completion and setting in operation was worse than that ever gained during the preceding years. I had reached a point when I began to question the ability of any kind of an apparatus to help me.

One of the chief causes of the tar difficulty arose from the short distances between my regenerative furnaces and my condensers and washers. There was no opportunity for the gas to be properly cooled; hence the deposit of copious quantities of tar in this unpleasant mode. While in the midst of my difficulty I learned that an apparatus was being used in Europe very largely that would actually remove tar. I was prepared to try anything that promised even fairly, but without the slightest belief that it would be of any benefit to me. In other works, under different conditions, I had no doubt that this apparatus must be of value. It had received the indorsement of many prominent engineers whose names and reputation were known to me. I explained the exact condition of my works, and was glad to be advised that this apparatus, known as the "Walker Tar and Carbonic Acid Extractor," would be put into position on my premises, and ample time given to make trial of same; and that if it did not succeed in removing the tar and relieving me entirely from my troubles it would be taken down and removed at the expense of the contracting parties.

You can rest assured, gentlemen, that I did not delay a moment in having the apparatus placed in position, and it has been in constant operation since. It has fulfilled every guarantee. I find no trace of tar in my "Standard" washer, and, of course, none in the purifiers.

In order that you may have a knowledge of the general appearance of this apparatus, permit me to explain the diagram. The gas inlet is at *A*, and terminates in the narrow chamber *B*. The gas cannot leave this chamber without immersing itself in from ½ to 3 inches of concentrated ammoniacal liquor. This concentrated ammoniacal liquor is received from the "Standard" washer-scrubber. In sealing itself in the ammoniacal liquor it comes in contact with the most powerful agent for breaking up the globules of tar, and the tar is deposited in a large, unobstructed



space below, permitting the gas to go forward. In going foward it comes in contact with numerous narrow tubes, *C*. All the lighter tars which still remain in contact with the gas are in this way caused to separate. The gas, freed from tarry matters, enters the large gas chamber *D*, and passes out through the outlet *E*. The automatic tar-valve *F* takes away the tar as fast as deposited without affecting the seal. The excess of ammoniacal liquor passes away at *G*.

You will thus see that there is no possibility whatever of this clogging up, as is the case with nearly every other apparatus designed for the removal of tar. But little back pressure is given. It is so arranged that it can be run anywhere from ¼-inch to 3-inch seal. When it is once determined what is to the best advantage for the apparatus it can be fixed at that point, and after that requires practically no attention.

Thus far I have referred to the apparatus as dealing exclusively with the tar. It is almost of equal value, however, in the removal of carbonic acid. The very best medium for dealing with carbonic acid is concentrated ammoniacal liquor. If the product from coal was somewhat larger, ammoniacal liquor alone would suffice to remove all the carbonic acid without the use of lime or oxide of iron. Indeed, we read that this is now being done at one or two works in England, where the purification is effected in closed vessels.

As a matter of fact I find that all the purifiers are not only much cleaner, but they last longer, proving to me that carbonic acid is dealt with to a large extent.

I shall be glad to have any of my friends visit the Bridgeport gas works and inspect the apparatus. I certainly can recommend it to any who, like myself, has found difficulty in dealing with tar. From my bitter experience I am rather inclined to the opinion that most gas engineers have, at times, like myself, found *coal tar a Tartar.*

Discussion.

The President—Mr. Page will be glad to answer any questions you may wish to ask with reference to what has been read.

Mr. Humphreys—In what part of the works is it placed?

Mr. Page—It is placed after the condensers and before the washers.

Mr. Humphreys—What would be the temperature of the gas there?

Mr. Page—The temperature of the gas at that point would be just that at which it was leaving the condensers, which would be ordinarily at a minimum of 62° or 64°, and a maximum of 82°.

Mr. Allyn—About what would be the size for works of 20-inch connections?

Mr. Page—It is made in sizes of 3×3 (five feet deep being the common depth of all the apparatus), 4×4, 5×5, 6×6, and 7×7. The smaller size, 3×3, answers for works which turn out about 125,000; the 8×8, for works of a million capacity; 15×15 for works of three million feet capacity. Permit me state further my views as to the cause of the hard deposit in the connections before and after the condensers and washers, also in the tower-washers and "Standard" washer-scrubbers. In many places artesian well water is used in the condensers and washers. This almost invariably contains lime and magnesia, which com-

bines with the carbonic acid in the gas to form carbonates of lime and magnesia. This deposit is made still more objectionable when there is united with it the particles of unconsumed carbon which are carried from the retorts with the outflowing volume of gas through the hydraulic main, a part being there deposited, but a portion going forward as far as the washers, and sometimes even to the purifiers.

It is now generally admitted by gas engineers that the tar should be liberated from the gas before it has reached a low temperature, say 70°; otherwise it has a strong tendency to draw to itself the illuminants in the gas. In the larger part of the United States it will not have reached this temperature when it is leaving the condensers. It is, therefore, a most advantageous arrangement to interpose an apparatus which at this point will eliminate every particle of tar. When it goes forward to the washers and purifiers it not only is an obstructive nuisance but a voracious robber. A further great objection to the admission of tar to the "Standard" washer-scrubber is the injurious effect upon the ammoniacal liquor. The admixture is so intimate either in the tower or "Standard" scrubber, that it is almost impossible to separate the two in the ammoniacal liquor well befo e it becomes necessary to pump it into a tank car or barge which conveys the liquor to the ammonia works.

This tar, so intimately mixed with the ammoniacal liquor, is almost worthless to the distiller, even when separated, and is generally allowed to run to waste. Here, of course, is a loss to the gas company in whatever percentage the tar goes with the ammoniacal liquor. It causes a loss also to the manufacturer of sulphate and aqua ammonia, as exceeding care and special apparatus and material for purification are needed to eliminate the tar. It would without doubt add a certain percentage to the value of the ammoniacal liquor if it could be obtained entirely free from tarry particles. You can well understand that this was one of the compelling motives that led me to investigate every apparatus which I could learn of in technical journals or from gas engineers, that had for its object dealing with the tar.

Mr. Greenough—Why is not the best place for the tar extractor immediately after the hydraulic main?

Mr. Page—The tar is then at too high a temperature. It would heat the ammoniacal liquor in the tar extractor, driving the ammonia forward, and thus, at this higher temperature, permitting the larger part of the tar to pass the apparatus.

Mr. Greenough—I do not see any reason why we do not separate the tar before it goes to the condenser.

Mr. Page—It has been ascertained that a percentage of the gas leaving the hydraulic main and passing the condenser is contained in small vesicles or globules of tar. These float like balloons, and require to be broken up, not only by coming in contact with hard surfaces, but especially by being immersed in a strong chemical compound like ammoniacal liquor.

Mr. Chase—What proportion of ammoniacal liquor is used?

Mr. Page—The entire product which has been taken out by the washer-scrubber, the washer-scrubber being placed at an elevation above the tar extractor, and the ammoniacal liquor flows into that by gravity.

Mr. Chase—Does not that permit considerable tar to pass in spite of the ammoniacal liquor?

Mr. Page—The tar is entirely eliminated, and does not go on to the washer-scrubber.

Mr. Chase—Is it taken up by the ammoniacal liquor?

Mr. Page—Yes.

Mr. Chase—Is the tar absorbed by the ammoniacal liquor? If the tar is taken out by the ammoniacal liquor, is it not held absorbed in that?

Mr. Page—No, it drops to the bottom. Only a slight portion of the very lightest is retained by the liquor, and that we can easily treat. It passes away, not as tar, but probably as a little light oil, and the liquid is almost pure ammoniacal liquor.

Mr. Humphreys—What is the best place for the exhauster?

Mr. Page—My education has not been largely in the direction of the practical use of exhausters, but my observation in visiting many gas works leads me to believe that better results are gained by placing the exhauster immediately after the hydraulic main. I think this the usual experience in English works.

Mr. Humphreys—Does the tar extractor work under pressure at Bridgeport?

Mr. Page—At Bridgeport the average pressure is about 2 inches. This, however, is easily regulated by a valve so that the pressure may be from ½ to 3 inches.

Mr. Chase—I do not think I made my point clear. You find, as you say, much trouble in getting the tar from the ammoniacal liquor; but why does it separate out so easily here?

Mr. Page—In the ordinary way the tar is dealt with by the washer, as well as the ammonia; but here the washer deals solely with the ammonia, and, of course, the carbonic acid which may be left, leaving the purifiers to take the balance of the carbonic acid as well as the sulphur compounds.

Mr. Chase—I still do not see why you should be troubled with the tar in your process.

Mr. Page—The tar passes away into the tar tank, and the ammoniacal liquor passes away into the ammoniacal liquor tank. In all gas works they now have separate tanks for the ammoniacal liquor. In the Albany works they have a separator where the condenser and hydraulic main liquors are passing. The ammoniacal liquor, in passing on, is pretty thoroughly freed from heavier tars, and then a separate pipe is run from the apparatus to the ammoniacal liquor tank.

Mr. Neal—I do not understand precisely the position of the tar extractor as compared with the other apparatus.

Mr. Page—First, the exhauster, after the retorts; then the condenser, then the tar extractor, and next the washer and purifiers. Permit me to add, with regard to the guarantees as to the absolute effectiveness of this apparatus, that in negotiating with General A. Hickenlooper, President of the Cincinnati Gas Light and Coke Company, he said to me that his doubts were so great as to the ability of any mechanical appliance to deal with the tar that he would not adopt this apparatus unless the manufacturers would deliver one to him at Cincinnati, freight and duties paid, sending over their own workman to set it up on his premises, without expense to him, and guarantee to remove every trace of tar, and give him six months' time in which to test it. I communicated this to Messrs. C. & W. Walker, of London, who are among the largest manufacturers of gas machinery in the world, and by the next mail they advised me they accepted every condition. I could not but conclude then that the apparatus must have absolute merit.

Mr. Neal—Do we understand that you recommend this to take the place of the "Standard" washer-scrubber? (Laughter.)

Mr. Page—I had supposed that the paper from Mr. Gerdenier, whom I represented, together with the statements previously made by me, covered fully the question of Mr. Neal. However, it gives me pleasure to state again that the necessity exists as much for an apparatus that would deal effectively and exclusively with the tar as for one which will completely remove all the ammonia.

Mr. Slater—As I understand you, at the Bridgeport works the gas passes from the Walker tar extractor to the "Standard" washer-scrubber and the liquor is returned to the tar extractor.

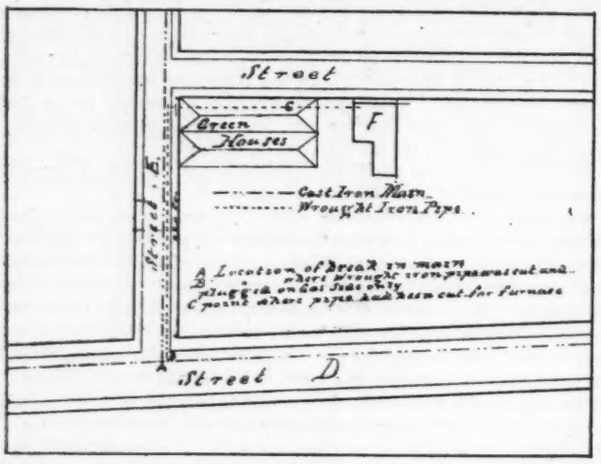
Mr. Page—The ammoniacal liquor is run by gravity from the "Standard" scrubber to the tar extractor. Those who have paid careful attention to the articles appearing for a year or two past in the gas journals cannot but have observed that a strong movement is now going on in the direction of purification in closed vessels. With the tar and ammonia dealt with in special apparatus, and with the impurities in the coal gas alone remaining, it is a matter which actual results have fully demonstrated that concentrated ammoniacal liquor can be used in sufficient quantities to remove all these impurities. By a series of stills and pumps the gas is brought in contact with a given volume of concentrated ammoniacal liquor, with the result that it is delivered to the holder freed from every impurity, except from 5 to 7 grains of sulphur per 100 cubic feet. It is my firm conviction that in ten years there will not be a purifier in use in any considerable gas works in the United States—that there will not be a new purifier built after five years from this date. At the present time, in Great Britain, the sulphur impurities in coal gas are obtained, in the form of pure sulphur or brimstone, to the extent of from 50 to 80 pounds of sulphur per ton of coal carbonized. The time is near at hand when gas companies in the United States will be in the receipt of a considerable income from the sale of sulphur recovered from the coal carbonized.

On motion of Mr. Taber, a vote of thanks was tendered to Mr. Gerdenier for his paper, and to Mr. Page as his representative and subtitute.

A Leakage Experience at Providence, R. I.

Mr. Slater—If it would not detain the Association too long, I would like to give to you the benefit of an experience, the gaining of which will probably, and unfortunately, cost the Providence Gas Company one or two thousand dollars. Referring to the diagram [see following page], suppose that *D* represents the main avenue, while *E* represents a cross street, and that, some years ago, gas was called for at the point *F*. We then started with a 2-inch pipe from this 12-inch main at *A*, and continued it down *E* street, across the lot to this house *F*. Last year we had occasion to lay a main through *E* street, and as the small pipe was not in use, and as we were not to have any further use for it, we cut it off near the 12-inch main at *B*. We plugged the pipe on the main side,

but allowed it to remain open on the outside. After the pipe had been laid through this lot a greenhouse was built directly over it. During the month of January a break occurred in the 12-inch pipe near the place where the 2-inch pipe had been cut off at *A*, and the supposition was that the end of the 2-inch pipe, near *B*, not having been plugged up, and there being no other outlet for the gas to escape, it followed along



the pipe down and into the greenhouses. As the proprietors of the latter had cut the pipe at *C*, enough gas escaped into their greenhouses to destroy many of their plants. As before intimated, they will probably make a claim upon us for damages. This experience was something entirely new to me. Prior to its having happened we never thought it necessary to plug up an old supply pipe when we cut it off. We are in the habit of cutting off services which are not likely to be used, but have never been accustomed to plug up the outlet end. In the case under consideration we would have been saved from a suit for damages had the plugging up plan been followed. I do not know whether it is the general custom of our members to plug up the outlet end of unused services, and while it has never before been the practice at Providence to do so, hereafter we shall be careful to see that it is always done.

The Semi-Annual Meeting.

Mr. Stiness—For many years there was held a semi-annual meeting of the members of the New England Association, and I think that all who attended the last semi-annual will never forget the pleasant occasion. I move that the matter of a semi-annual meeting be left in the hands of the Directors, and that it be held at such time and place as to them may seem best. I believe the practice of bringing the members together on such occasions is an excellent one, and I hope the good old custom will not go out of use. Many of the members who desired it asked me to be their spokesman in bringing the matter before the Association.

The President—You have heard the motion of Mr. Stiness—that the subject of holding a semi-annual meeting during the coming summer be left to the officers of the Association, with power to act in their discretion as to selecting time and place. Will you express your opinion upon the subject of holding the semi-annual meeting?

Mr. Neal—I understand the intention is to take a vote on the expediency of holding a semi-annual meeting, and, if the Association decides to have it, let the Directors fix the time and place.

The President—That was the intention, but perhaps the Directors would like some expression of opinion by the Association.

Mr. Cabot—As I understand it, now the question of the expediency of holding a semi-annual meeting is left for the determination of the officers of the Association, but, for some reason or another, last year they decided not to have a meeting. I have been a member of the Association since its organization, and have attended every meeting, with one exception. I have also attended all the semi-annuals. The semi-annual meetings may not be as valuable in the way o business connected with our occupation as the annual meetings, but to my mind they are as great a benefit to us in other respects. I think the better we become acquainted with each other, and the nearer we are drawn together in consequence, the more willing we are to interchange views. I hope, when this vote is put, it will be put in such a way that the Directors will understand it is the wish of a large majority of this Association to have a semi-annual meeting.

Mr. Neal—I would suggest to Mr. Stiness, as an amendment, that a semi-annual meeting be held this year, and that the time and place be left to the Directors.

Mr. Stiness—I accept that amendment.

The President—The form of the motion having been changed, it now reads that it is the sense of the Association, and the wish of this meeting, that a semi-annual meeting be held this year, and that the time and place and arrangement be left at the discretion of the Directors.

The motion of Mr. Stiness was agreed to unanimously.

Votes of Thanks.

Mr. Allyn—Messrs. Taber and Prichard informed the Association, when making their report as a Committee on Photometrical Research, that they had been aided in their work by jet photometers which had been kindly furnished by Mr. E. C. Jones to the Committee without compensation. I therefore move that the thanks of the Association be tendered to Mr. Jones for his courtesy. [The motion was agreed to.]

Mr. E. C. Jones—I thank you, Mr. President and gentlemen, for your vote of thanks. Permit me to add that the Association is heartily welcome not only to the photometers, but to anything and everything else that I can make or do for them. I will gladly do anything in my power to assist this Committee. (Applause.)

Mr. Taber—I move a vote of thanks to our worthy President, Mr. Harbison, for his able occupation of the chair during this sitting of the Association. [The motion was put by the Secretary, and unanimously carried by a rising vote.]

Response of the President.

Mr. Harbison—Gentlemen of the Association: I feel very grateful for this expression of your feeling as to the way in which I have been able during the past year to perform the duties belonging to the office of President of the Association, and particularly so when I remember the able and efficient manner in which those duties have been performed during the years which passed away before I was called to this position. Looking back over the list of former Presidents of this Association, from Greenough, Sr., down to Greenough, Jr., who have been honored by being placed in this position, and who have honored the Association by the way in which they have performed their duties, I entered upon the office assigned me by your pleasure, feeling that if I could in any degree approach the able manner in which they had acquitted themselves I should be more than repaid for any labor I might have to perform. Your expression of thanks would indicate that in some measure my desire in that respect has been fulfilled. It is a very distinguished honor to have been called by you to this position, and during the two years of my occupancy of this chair that honor was brought continually before me when meeting with gas engineers and others connected with our business in different parts of the country. It has been my pleasure and privilege several times during these years to meet with other Associations, and I have occasionally been called upon to represent the New England Association at those gatherings. There has been no time in my life, when in attempting to speak before other Association gatherings, I enjoyed greater pleasure than when I was permitted to respond in behalf of the New England Association. My only regret in connection with it was that somebody more capable did not represent you. If what was done has met with your approbation I am heartily glad. It has been a great pleasure to meet so many members here at this meeting. We have had an exceedingly pleasant time, and I trust it has also been a profitable one to all of us. These meetings do us all good. We go home strengthened by the pleasant intercourse and friendship which grow out of our associating together. We have nothing but kindly greetings for each other. Not an unpleasant word has been spoken, and we have not an unkind thought in our hearts toward each other; only a cordial feeling of friendship exists. If we differ in opinions we are able to get at the facts by sifting our ideas, and rubbing one against the other, and we are better able, when we go home, to perform the duties assigned to us in our respective places in "enlightening" the people. Gas is going to remain the light of the world. These other arrangements for giving light are only little spurts here and there—little rush lights—they are here for a time, after which they will all die out; but gas will be continued. There is no doubt about that in my judgment. Not only is gas to continue to give light, but it is coming into greater and greater use for domestic purposes in displacing anthracite coal. I think, also, that coal is to be displaced by gas for manufacturing purposes. The assertion is made by a prophet who knows what he is talking about, that this millenium in the use of gas will come in about five years from this time.

I am very grateful to you for your kindness extended to me during these years, and my earnest desire is that every member may reach his home and family in safety and health, that our lives may be spared to meet again in the summer at our semi-annual meeting, and that we may long be enabled to go on in the good path in which we are walking—of doing good to our fellow men. (Applause.)

Mr. Leach—I do not want the Convention to adjourn without passing a vote of thanks to our worthy Secretary, Mr. Nettleton, for his indefatigable efforts to make this meeting a success. He has been persistent and successful in securing papers, and fully deserves a hearty vote of thanks from us.

Mr. Allyn—I am happy to second that motion, and to agree especially with the *persistent* part of it. I know this by my own experience.

The President—It affords me very great pleasure to put the question of a vote of thanks to our Secretary, and still more to add a word of commendation in respect to my personal knowledge of the way in which he has worked for the success of this meeting. He has been persistent, faithful and untiring in the performance of his whole duty. I am not aware that a single stone has been left unturned. I know the thanks of this Association are well deserved, and I know the vote will not be simply a formal expression of opinion, but will come from our hearts.

The motion was unanimously adopted by a rising vote.

Response of the Secretary.

Mr. Nettleton—I am very much obliged to you for this hearty vote of thanks, although I cannot feel that I deserve it, or all that the President has so kindly said in relation to the manner in which the work has been done. In my own estimation I fall very far short of what I conceive should be the ideal Secretary of such an organization as this; but if you are satisfied with my conduct of the office, as your vote indicates, I am pleased that my efforts are appreciated.

An Invitation from the Western Association.

Mr. Page—I received this morning a letter from Mr. McMillin, President of the Western Gas Association, who had just returned to Columbus after a week spent in Chicago arranging for the meeting of that Association which is to be held there on the 9th, 10th, and 11th of May. He wished me to ask that there may be a large delegation present from the New England Association. Presenting his kind wishes to you here, he promises that the next meeting will be the most interesting and valuable ever held by the Western Association.

The President—I can supplement what Mr. Page has said on that point by experience. It has been my pleasure, in company with some of the other members of the New England Association, to attend the meetings of the Western Association for the past four or five years, and it has always been with regret that we have been obliged to tear ourselves away from those gatherings. Those who may attend the coming meeting will find the Western men large-hearted, clever, sociable, and good-natured people. Some of the members have found that that feeling is not confined to the active members of the Association, but that others whom they meet there will also cause you to feel that you would like to meet them more frequently.

The convention then adjourned.

IN MEMORIAM.

The Committee to prepare a memorial on the late

MR. DAVID BRAYTON,

of Brockton, Mass., propose the following minute:

"The Association recalls at this time the memory of one of its members, Mr. David Brayton, Supt. North Bridgewater Gas Light Company, of Brockton, Mass., a worthy associate in our labors, who died June 3, 1887.

"We place this upon our records as a just tribute to his many good qualities of heart and hand.

R. B. Taber,
H. B. Leach, } Committee."

[A Paper read before the Society of Gas Lighting.]

Experiences in the Purifying Room.

By Col. F. S. Benson.

That portion of the apparatus of manufacturing gas designed to free the crude product from many of its impurities—namely, carbonic acid, sulphuretted hydrogen and other compounds of sulphur—is often the location of perplexing difficulties, which, for the time, seem almost impossible to understand, and more difficult still to remedy. An experience of this kind having taken place during the past winter in the purifying house of the Nassau Gas Light Company, and believing that such experiences unless carefully noted and remedied are of no possible use, I have ventured to place the facts before this Society, feeling that in relating them they may prove useful to other members who might happen to have a similar experience.

This production is not, then, to be considered as an essay on manufacturing gas, or a finished thesis on any portion of the apparatus, but simply as a narrative of one experience out of the many that daily, and almost hourly, fall to the lot of the average gas engineer.

The plant of this Company, originally designed for a maximum production of one million cubic feet of gas in 24 hours, had, during the month of December, 1887, been considerably overtaxed, as our daily manufacture was somewhat over that amount; and out of 24 benches of sixes 22 benches were in active operation. Everything, however, went well up to the morning of December 25th, when, at 2 o'clock, the day foreman was called to the works on account of a back pressure, in the first purifying box, of 3 inches beyond the normal amount, which made the total pressure in the works some 15 or 16 inches. The purifier was immediately changed, a fresh one being fortunately in readiness, and the trouble for the time disappeared. The purifier thus changed had passed but 4,105 cubic feet to the bushel of lime, had showed no stain on paper moistened with acetate of lead, and, under ordinary circumstances, would not have been changed before passing somewhere about 6,000 cubic feet. At this time a standard Youghiogheny coal was in use, with the addition of 15 per cent. of Hopetoun cannel. (Later, but 8 per cent. of Hopetoun cannel was used.) Three layers of lime, of 5 inches in depth each, and a lower layer of 1½ inches, were used in each purifying box.

The following changes of purifiers were made for raising pressures on the bottom of the first box, instead of the usual custom of waiting for a stain more or less solid from the second box. Up to Jan. 7, a period of 14 days, six purifiers were changed, showing an average result of 5,008.6 cubic feet to one bushel of lime. At this time, owing to an increase of pressure on the bottom of the first box, changes were rendered necessary as fast as the boxes could be emptied and filled; and this, in many cases, amounted to changing two boxes in 24 hours. Even then before the change could be effected retorts had to be missed, lessening the volume of gas, and keeping the pressure at such a point that the belts on the engine and exhauster would not slip. A mixture of lime and breeze was tried, on the lower layer, of 1½ inches in the boxes; then one, entirely of breeze, of 1½ inches, with no effect, other than, when put in action at the third box, it showed a back pressure there with an entirely clean box of lime.

All the connections between the boxes were of 20 inches; the dry centerseal and inlet and outlet connections to the purifying house were thoroughly tested every 15 feet for pressure, but every test invariably showed the difficulty to be in the material in the boxes, and entirely independent of any of the connections. A mixture of breeze and lime was then tried, in the proportion of 25 per cent. of breeze to 75 per cent. of lime, with no favorable results. A smaller quantity of lime was then put into the boxes, in thinner layers of 2 inches, and four layers to each box, which helped the difficulty, comparatively; but only in proportion to the amount of material used.

An analysis of the crude gas was then made, just before it entered the purifiers, in order to see if there was an excess of carbonic acid. There was found but 2½ per cent., a smaller quantity than usual, thus removing the apprehension that possibly the coal used was producing more carbonic acid than usual, with the effect of making a carbonate of lime in the purifying boxes.

An analysis of the waste lime showed a large excess of carbonic acid, or excess of carbonate of lime, as compared with the sulphates and sulphides.

An analysis of the fresh lime in use showed about 52 per cent. available matter, as against 65 per cent. of a first rate article of oyster shell lime.

With the above facts in our possession the following decisions were arrived at:

1st.—The fresh lime was some 13 per cent. below the standard—having that excess of carbonate, silica, earthy matter, etc.

2d.—That the carbonic acid had formed carbonate of lime before the sulphates or sulphides were formed, and thus showing a pressure on the first box before showing a stain on the second box.

3d.—In waiting for the gas to show a stain on the second box an excess of carbonate had been formed in the first box, and thereby a back pressure was obtained.

The remedy applied was to change the purifiers after a certain quantity of gas per bushel of lime had passed, without waiting either for a stain or pressure, thus departing from the almost universal custom of holding the box until lead paper was stained, either on the second box, or, as is the custom, to wait until the third box stains.

In deciding how much gas should be passed before changing, it was assumed that a standard Youghiogheny coal, such as that from the Penn, Westmoreland, or Ocean mines, would purify, from a good quality of oyster shell lime, 6,000 cubic feet to the bushel; and upon printed analysis

of Hopetoun cannel it was found that but 2,000 cubic feet could be purified.

Then, 92 per cent. × 6,000 cubic feet = 552,000
8 " × 2,000 " = 16,000

Total..... ..... 568,000 cu. ft.

Or, the mixture would purify 5,680 cu. ft. per bushel.

To make everything safe 5,500 cubic feet was taken to be the limit, and the boxes were changed when the station meter indicated the proper amount of gas had passed through. As everything under this system worked smoothly for some two weeks, it was thought it might be safe to increase the amount of gas, from 5,500 cubic feet per bushel to 5,800 cubic feet, especially as the cannel coal had been changed, from using 8 per cent. of the Hopetoun variety to 6 per cent. of Breckenridge cannel. Accordingly, that amount of gas was passed through, and the practice has been continued since with no apparent disadvantage.

From the foregoing experience it has seemed to the writer that the general custom (it might be called rule) of changing the purifiers for a stain on the second box, or, in some instances, on the third box, is one that is subject to many chances of error liable to arise from different conditions that might exist in the lime used for purifying, or in the way in which the boxes were filled—it is a fact that sometimes a pet cock in one corner of the box would show a stain, when the one in the other corner of the same box would be clean—this almost universal custom could be well-changed for the system of ascertaining, from the character of the coal used, what the lime ought to do, and then changing the boxes accordingly after having passed the proper amount of gas. Certainly, in thus doing no guess work is indulged in, the process becoming entirely a matter of figuring. Should anything different from the ordinary run of experience then occur it would be much easier traced out than under a condition of affairs which, to say the least, is in a great measure uncertain.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Annual Meeting, Boston, Mass.—The proceedings to be digested in connection with the annual meeting of the Boston Gas Light Company have been awaited with much interest by those who strive to keep posted in regard to matters that may in a measure determine the outcome of the efforts of the Bay State Company to become an appreciable factor in the future as a supplier of gas to the people of Boston. The result of the meeting, as viewed at this distance, and pondered over by one who must necessarily confess utter inability to form a safe conclusion, in that an attempt to read between the lines must rest on guess work, would seem to be that the proprietors of the old Boston Company are still in a mood which augurs poorly for the ultimate success of their would-be competitors. The Bay State pottage evidently possesses no attraction yet for the palate of the older organization—even though we are in the midst of the Lenten season, when one would think that, were pottage to win, now would be the appointed hour. And it does not seem logical that the ancient mess should gain the day, for none are now so poor as to do it reverence. At any rate the stockholders of the old Company held a most united meeting, and they had much cause for content at the records of the business transacted during the year, the annual reports showing that everything connected with the Company had worked smoothly during the twelvemonth. Thus armed, the proprietors proceeded to an election for Directors, which terminated in the selection of Messrs. Augustus Lowell, Chas. H. Parker, Nath. J. Rust, Louis Curtis, and Robert Codman. Mr. W. W. Greenough was chosen Treasurer, Mr. Chas. C. Smith being appointed Clerk. The only change noted is that of the substitution of Mr. Codman for Mr. Augustus Flagg; but we understand this move had no political significance whatever. It should have been stated that the attendance was remarkably large, the unwonted gathering possibly being traceable to the impression that some official utterance concerning the position assumed by the opposition would be made. The official reports, however, were silent on this question, which grated rather harshly on the opinion of stockholder F. A. Brooks, who, when the reports had been affirmed, quite strongly advocated the necessity of doing something to ward off the threatened war of rates with the Bay State Company. Mr. Brooks seemed to be strangely and heavily burdened with the fear that the Board of Directors of the Boston Company did not have scope enough in the matter of present power to make or receive overtures "with other parties in interest," and despite an assurance from Director Curtis that he and his associates had all the power they wanted, the "overburdened" moved the Directors be given power to receive proposals from other companies for the purchase of the Boston Gas Light Company, or the acquisition of other companies by the Boston Company. Mr. Brooks had a very large minority when the votes were counted; and we opine that many others interested "more or less" in Boston's gas suppply will be in about equal state with that vote when the whole matter is adjusted. Still, whatever they get will be clear gain; and probably this is all that was expected by them from the start.

It is the intention of the proprietors of the Montreal (Can.) Gas Light Company, to supplement the erection of the new plant, now in process of construction, with an extension of the leading main therefrom through Berthelet and down Union avenue, thence through St. Catherine to the Cote St. Antoine quarter. This will necessitate a general overhauling of the branch mains in the section noted.

Mr. A. M. Copp, Treasurer of the Exeter (N. H.) Gas Light Company, writes that the Directors, having decided to cancel $12,000 of the capital stock, are issuing in exchange for the old certificates new ones in accordance with the present capitalization. The dividend paid (3 per cent.) in Feb. last was the first return made to the shareholders for seven years, although in the interim the price of gas had been reduced to $2.80 from $3.75 per thousand—in effect the consumers have been receiving the dividends. With a resumption of dividends, however, Mr. Copp does not propose to cut off the consumers' returns, for he closes his letter in the following way: "The Directors appreciate the co-operation of the people of Exeter with the Company in the increased use of gas, and they are determined to foster this condition by reducing the price for gas as fast as the business will warrant it. The business year of the Company closes with the 30th of May, and as soon as the accounts of the Company are closed and the business of the year determined, the reduction in price will be made. We hope the consumers will congratulate the stockholders on their recent dividend, and we promise to make the consumers a dividend, as large as possible, in June in the reduction in selling rates."

Mr. Nettleton, Sr., has arranged for the construction of a new holder for his Mt. Vernon (N. Y.) gas works. The vessel will have a storage capacity, in round figures, of 200,000 cu. ft., and is to have two lifts of 40 feet each. Messrs. Deily & Fowler have agreed to complete their contract by Sept. 1st. The tank, etc., is to be built by A. P. Whittier. Considerable main extension will be made during the season, to include some 12 inch and much 6-inch. The ex-Secretary does not keep very far away from the drum corps.

Sounding the Warning.—Mayor Kirk, of Syracuse, N. Y., in a recent address to the City Council, admitted that arc street lighting was a pretty desirable thing—but also called attention to the fact that it was decidedly expensive. We presume his Honor does not quite comprehend the necessity of illuminating either the hill tops or the marshes of Syracuse with "more or less thousands" (in candle power) of lighting agents, especially so as the moon has been equal to the task ever since Asa Danforth, about a century ago, supplanted the Onondaga red men in their job of extracting salt from the bowels of the earth in that vicinity. The Mayor, in concluding his remarks, said: "The limit" [meaning the amount of money which, under the city charter, may be appropriated for street lighting] "has nearly been reached, and unless the charter is further amended the multiplication of street lights must cease."

Binding the Bargain.—This time it is positively settled; although we said something similar about three months ago. However, on Feb. 25, a merger agreement was entered into between the Galveston Gas and Electric Light Companies, whereby the former absorbs the latter, the electric proprietors receiving $94,000 in shares, at par, of the Gas Company's stock.

The hitherto independent gas plants operated in the towns of Johnstown and Gloversville, N. Y., have been merged into the Johnstown and Gloversville Gas Company, the works being located on Market street in the first-named place. The new water gas apparatus was fired up about three weeks ago.

On the first inst. the lamp department opened bids for supplying gas to the street lamps in the outlying districts of Boston, Mass. The proposals are appended: Dorchester Company, 1 year, $2 per M., 3 years, $1.90, 5 years, $1.85; Charlestown Company, 1 year, $1.65, 3 years, $1.60, 5 years, $1.55; Jamaica Plain Company, 1 year, $2, 3 or 5 years, $1.90; Brookline Company, 1 year, $2, 3 years, $1.95, 5 years, 1.85; South Boston Company, 1, 3 or 5 years, $1.65 for 4-ft. burners; 5-ft., or over, $1.30; East Boston Company, 5 years, $1.60; Roxbury Company, 1, 3 or 5 years, $1.65. The bids were taken under advisement.

THE Agawam Gas Company, to operate in West Springfield, Mass., has been chartered. Mr. J. R. Smith is President and Treasurer. Capitalized in $50,000. This ought to be an excellent place for such a venture.

REORGANIZED.—In consequence of the resignation of the Sec. and Treas., Mr. R. A. Stranahan, who has entered into another line of business, a special election meeting of the stockholders of the Tonawanda (N. Y.) Gas Company was held with the following result: President, J. H. De Graff; Vice-President, P. W. Scribner; Secretary, A. H. Crown; Treasurer, Chr. Schwinger. These gentlemen, together with Messrs. P. S. Humphrey, A. G. Kent and R. A. Stranahan, comprise the Board of Directors. The Tonawanda folks are likely to overhaul their plant this season.

THE new 400,000 cubic feet holder of the Worcester (Mass.) Gas Light Company works splendidly, and a "Standard" washer-scrubber is now being added to the plant. Best of all, however, we are able to say that Agent Rollins is gaining, although slowly, in health every day.

SAN FRANCISCO (CAL.) GAS SHARE EARNINGS.—Mr. A. F. Beasley, to whom we have often been indebted for information concerning gas matters in the Golden State, forwards us the following recapitulation of dividends paid, in 1887, to holders of shares in lighting companies chiefly owned in San Francisco. Premising his statement with the remark that the files of the San Francisco *Bulletin* have afforded him a large share of the facts detailed, Mr. Beasley starts in with the following table:

Name of Company.	No. of Dividends, '87.	Total Amount.
San Francisco	12	$360,000
Oakland	12	72,000
Capital (Sacramento)	4	40,000
Central	4	80,000
Pacific Gas Improvement	12	144,000
Los Angeles	12	16,200
Stockton	12	15,000
California Electric Light	12	80,000
Pacific Lighting	12	8,450
Totals	92	$815,650

Continuing, Mr. Beasley says: "The Capital and Central paid quarterly; the others monthly. The Central and Pacific Gas Improvement, although different corporations, operate the same plant, which was erected by the Central, but afterwards leased to a Philadelphia corporation for a number of years, based at a 4 per cent. annual rental on a paid up capital of $2,000,000. The Philadelphia corporation turned the lease over to the Pacific Gas Improvement Company, a home corporation, and an active agent in supplying a portion of San Francisco with gas. The city was recently threatened with a third organization, to be known as the Standard [mention of this concern was formerly made in the JOURNAL], which purchased the site formerly occupied by the Selby smelting works, but then sold its patents to the two existing companies and retired from the field! I believe these practices are not unknown to Eastern gas men. The capital of the old San Francisco Company is about ten millions of dollars, so that its dividend rate is only 3.60 per cent. The Pacific Gas Improvement Company paid 4.80 per cent. on its capital of $3,000,000, and 4 per cent. on the capital of the Central. The Oakland paid at the rate of 2.60 per cent. on the par value of its stock; Los Angeles, 3 per cent.; Capital, 8 per cent.—par value $50; and the Stockton, shares in which are also at par at 50, paid 6 per cent. The California Electric Light Company has made several changes in the scale of its dividends. In the last quarter of '86 it paid 4 dividends, 2 of 8 cents per share, and 2 of 10 cents. In 1887 the first three dividends were at the rate of 10 cents, followed by four of 12½ cents, then three at 15 cents, and, finally, 2 at 17½ cents per share. I might add that it is now paying 20 cents per share per month. Evidently, arc lighting has come to stay in San Francisco; and it seems to me if our 'Frisco gas companies watched the JOURNAL closely—had they even taken its advice in this matter when Mr. Thomas read that paper of his before the Society of Gas Lighting, something like a year ago—they could have secured control of the local electric lighting Company's stock at a very low figure indeed. Other gas companies in the remaining prominent cities of our State, however, have not allowed their opportunities in this regard to pass them. In concluding the analysis of the above table it but remains to be said that the Pacific Lighting Company paid 6 dividends of 15 cents per share, thereafter increasing the monthly return per share to 20 cents, and also increased the number of shares from 3,500 to 5,000. Taken as a whole, the Pacific coast gas men ought to be satisfied with the returns reaped in '87, although I have no hesitation whatever in saying that '88 will make a much better showing."

STREET LIGHTING, INDEPENDENCE, MO.—Mr. H. D. Wilson is manipulating the electric light supply of Independence, and he has been attempting to induce the Town Council to make a 5-year contract with his Company under which 30 full arcs are to be furnished for the sum of $120 each per annum. The gilding offered by Mr. Wilson, in his anxiety to pose as a public benefactor, is that the town will be charged only one-half of the contract price—always remembering that an iron-clad contract is in existence—the electricians being satisfied to chance the willingness of the property holders benefited to pay the other half by direct assessment. So far, Independence has only been able to see its way clear to maintaining 54 gas lamps, for which the Gas Company receives the munificent sum of $1,215 per annum; and Brother Wirt has to struggle along as best he may without any hint from the ruling powers which would go to show their willingness to contract with him for a period longer than a twelvemonth. If Independence wants electric lighting, the authorities, to be on the safe side, should look pretty carefully over the terms of the bargain which Mr. Wilson proposes to enter into with them.

SUPT. DECKER LEAVES HANNIBAL, MO.—We confess to having experienced great surprise on receipt of the news that Mr. J. H. Decker, who for the past eight years had superintended the Hannibal Gas and Water Companies with great ability and tact, tendered his resignation, the same to take effect from the first inst. Of course, men come and go; but we supposed that Supt. Decker was likely to remain a citizen of Hannibal for many a year. A day or two prior to that on which he was to resign his charge, the employes of the two companies presented him with a massive gold chain bearing the inscription, "Presented by employes of Hannibal Gas and Water Companies, March 1, 1888." This episode shows how he was regarded by his subordinates; while his superiors cannot point out a blot on the record made by him in his conduct of their interests. Mr. Decker has as yet made no other engagement, but we incline to the idea that he will not be long out of harness.

Mr. C. J. Lewis, formerly of Carthage, Mo., is now occupying the vacancy at Hannibal created by the resignation of Mr. Decker.

SOME CONTRACTS AWARDED TO PINE ST.—Manchester, Va., a lively city located on the James River, about opposite quaint old Richmond, is to be supplied with water from a plant to be installed by Toastmaster White. He will also furnish the place with an arc plant for street lighting. The contract for constructing the tank (132 × 29 ft.) for the new holder of the Williamsburgh (Brooklyn, N. Y.) Gas Light Company has also fallen to the lot of the festive Captain. Then, again, Supt. Boardman has authorized him to put in a quarter million daily capacity plant under the Martin process, at Macon, Ga. And so, Bro. Boardman, the Liebfraumilch is to be diluted? However, Pine street seems to have had a pretty good fortnight.

Under date of February 28 Mr. Emil Lenz writes: "I beg to inform you that the Boston Gas Light Company are so well pleased with the results of the Munich regenerative bench of 6's, which I erected for them last year, that they have ordered me to erect for them, at their Commercial Point Station, 6 new benches of 9's, after the Munich system. Among the orders booked for my fireclay material I may mention: 24 benches of 6's for Boston (Mass.) Gas Light Company; 4 benches of 6's for Citizen's Gas Light Company, Newark, N. J.; and 1 bench of 6's for Charleston (S. C.) Gas Light Company. Also, many orders for water gas generator linings.

At a recent session of the Detroit (Mich.) City Council, Ald. Reschke offered a resolution to appoint Jno. E. Sauers official gas inspector, vice David Cotton, resigned. The salary attached to the position is $5 per annum, and as that magnificent stipend was drawn from the treasury by Mr. Cotton prior to his "renunciation of the trust," Mr. Sauers is in doubt about qualifying for the job. The inspector has to furnish a $5,000 bond. We understand that Mr. Sauers agitates the trombone in the orchestra attached to White's Theater—who should not be confounded with Deacon White. Mr. Sauers ought to be an adept, therefore, in the matter of determining whether wind is blown through the meters by the Detroit Gas Light Company. Seriously, however, should not Detroit cease to make a farce out of what is a really responsible position?

The Montgomery (Ala.) Gas Light Company has chosen the following officers: President, M. L. Moses; Sec. and Treas., T. Gardner Foster; Supt., Peter Young.

COMPLETION OF THE UTICA (N. Y.) TRANSFER.—The Utica consolidation is an accomplished fact. According to the articles filed, the name of the new corporation is the "Equitable Gas and Electric Company of Utica." The Trustees are P. V. Rogers, L. V. Bell, E. N. Dickerson, Jr., W. H. Gebhard, H. Graham, R. M. C. Graham, Erazm J. Jerzmanowski, Harry Keene, and Casimir Tag. The agreement is to last for 50 years. The capital is $400,000, divided into 4,000 shares. The stock is divided in the ratio of one share of the new capital to the holder of each share of the Utica stock of the

Equitable Gas Light and Fuel Company, as that Company is the owner of the Utica Electric and Gas Company.

It is likely that the works of the Binghamton (N. Y.) Gas Light Company will be removed from their present location, at the foot of Washington street, to a plot on the north side of Court street, above Brandywine Creek. Apart from the fact that this change will enable the easier and safer receipt of naphtha supplies, another advantage will be gained because a valuable plot of land, which will readily command good prices for business sites, can be at once placed on the market. The transfer is in line with sound policy in all respects.

The bill to allow the Municipal Gas Company, of Albany, N. Y., to extend its business to places within a radius of 10 miles of Albany, contains a provision that Cohoes and Troy shall be exempted. The Assembly has ratified the measure.

Neenah has a Fire.—On the afternoon of Mar. 4 an oil storage holder on the plant of the Neenah and Menasha (Wis.) gas works caught fire. Before the flames were extinguished the roof covering the gasholder was consumed, and other damages were occasioned which caused a total loss of $1,100. Insured for $1,000. The water supply system of Neenah consists of street wells, and had the authorities taken the precaution of keeping the snow from the well tops the damage at the gas works would have been comparatively trifling. As it was, the firemen had to remove a hard crust of snow and ice from the well in the vicinity of the conflagration before they could bring their apparatus into play.

The Pawtucket Gas Company in Control.—We are indebted to Supt. Samuel G. Stiness for the following information: "The Pawtucket Gas Company will shortly acquire control of the local system of electric lighting on terms favorable to the stockholders of both companies. The stockholders of the Electric Company are to deliver to the Gas Company a sufficient amount of electric stock to insure the latter a controlling interest. The terms of the delivery bind the Gas Company to pay $125, and interest, per share for the electric stock, the payment to be made either in cash or in gas stock, reckoning the latter at $85 per share. The electric stockholders had until the 10th inst. to decide as to what mode of payment they would choose. Those who do not wish to dispose of their holdings in either way will not be compelled to do so, but will receive their dividends in the electric lighting company as before. The Gas Company will increase its capital stock $150,000, of which $50,000 is to be set apart for the purpose of making a pro rata stock dividend among present holders of record, every 7 shares of old stock being entitled to 1 share of the new. The remaining $100,000 is to be devoted to payment for the electric light shares. Three 'rights' on the gas stock sold recently at $34." Now all is peace and harmony in Pawtucket; and therein once more is perceived the fine Roman hand of Pawtucket's ablest gas man.

Again, the Jeter-Boardman Company.—Busy Boardman, booming briskly, brings before our notice the organization and incorporation, on Feb. 13, of the Tuscaloosa (Ala.) Water Works Company, capitalized in $75,000. The following is a list of Directors: Messrs. W. A. Jeter, of Brunswick, Ga.; J. W. Wilcox and A. E. Boardman, of Macon, Ga., together with G. A. Searcey and W. C. Fitts, of Tuscaloosa, Ala. The Board elected J. W. Wilcox, President; A. E. Boardman, Treasurer; and W. C. Fitts, Secretary. The brick foundation and 5 feet of the 136-ft. tower have already been completed. Upon about 5 miles of distributing main, from 10 inches down to 4, will be placed 50 hydrants. The Western Association meets in May, Bro. Boardman, so hurry along the 130 odd feet of that tower.

The Martin water gas apparatus to be added to the Macon (Ga.) plant will about double the present gas making capacity at that point. Mr. Boardman also intends to greatly extend the conduits of the water works department of the Macon Company. One cargo of pipe is already en route to the Sunny South, which is to be speedily followed by two more.

The capital of the Dayton (O.) Gas Light and Coke Company has been increased to $600,000—a 20 per cent. addition.

The new blood in the management of the Tonawanda (N. Y.) Gas Light Company seems to be of a lively and sound sort, for a 33⅓ per cent. reduction in selling rates has just been made. Former rate, $2.25; new rate, $1.50. Cheap gas, that.

The Boston Gas Light Company carries on its payrolls the names of quite a number of old men, who, on account of their good work in the Company's service in the past, although now too feeble to continue, are paid weekly wages that will average $5. Not much theoretical charity about this way of doing things.

The Bridgeton (N. J.) Company is making important changes in its main system. This place is one of the best (and most cheaply) gas lighted localities in the State.

The Peru, Ind., American Gas Company possesses a decidedly favorable long-term public lighting contract with the city, but does not wish to play the Shylock under it in any respect. In fact, at a recent meeting of the Council, Supt. Tracy was empowered to hand in an offer by which the Company agrees, during the remainder of the life of the contract, to accept $22 per post per annum in lieu of the $45 rate which it has the right to ex ct.

At a meeting of the Hamilton (O.) Council, held Feb. 28, was read a petition, signed by a number of prominent residents and taxpayers, asking for the passage of a gas ordinance providing for the raising of $150,000 wherewith to erect a new gas works, or for the purchase of the existing company's plant. The rules were suspended, and the ordinance, which accompanied the petition, was declared passed; all voting in favor of it. The matter will now be voted on by the citizens.

Jellico Gas Cannel.—In our issue for February 16th it will be remembered we published a map, showing the location of, and railroad facilities to and from the Jellico cannel mines. The Company is now in full operation, the present daily output being 150 tons, which quantity will be increased to 300 tons on or before May 1st. Reliable engineers believe that the Jellico grade of cannel is bound to become an important factor in coal gas manufacture throughout the States. One excellent authority on gas enriching asserts that it can and will equal oil, no matter what method of using the latter is employed. Messrs. Perkins & Co., General Sales Agents for the Jellico mines, publish a business card in connection therewith in our advertising columns.

The Maryland Meter and Mfg. Company have published and are circulating a very handsome pamphlet intended to call attention to the advantages in general of gas for cooking and the merit in particular of their "Success" gas ranges, heaters, and other domestic agents for keeping the cook in good temper, while at the same time the digestion of the upper circles of the household is aided. We understand that their genial, handsome and wide-awake Western General Manager, J. M. Murphy, "edited" the pamphlet, and, like everything else that he undertakes to do, the task was well performed.

Still Going Forward at Morristown, N. J.—A Newark (N. J.) correspondent—it seems strange that President Miller, of Morristown, forgot us this time—kindly forwards us a copy of the circular recently issued by Sec. and Treas. Pierson, of the Morristown Gas Light Company, detailing the new schedule of gas rates that took effect on March 1st. Residents in dwelling houses are to pay $2 per thousand, unless over 5,000 cubic feet of gas was used in the month; in which case a discount of 5 per cent. on the *excess* is allowed. Gas supplied to churches, public buildings, hotels, stores, etc., is to be charged for at the rate of $1.80 per 1,000, but 5 per cent. discount is allowed on the excess of a monthly consumption of 10,000 cubic feet. Again, special yearly contracts may be made by large users. Supt. Hunt must have been careful and energetic in his management. Our correspondent intimates that President Miller is inclined to secure control of the local electric light company, at his own figure, however. He is an astute financier.

The Passaic (N. J.) Gas Light Company has reduced its gross rate to $2.20 per thousand, payment within 10 days causing the fraction to disappear. The old rate was $2.50 gross, with 5 per cent. off on all bills settled within thirty days.

Messrs. Milton McClure, W. D. Turner, J. L. Rinaker and A. G. David have incorporated the Carlinville (Ills.) Electric Light and Power Company, and have capitalized it in $10,000.

The proprietors of the Richmond County (N. Y.) Gas Light Company have been experimenting in odd ways on gas making for some time back, and the residents in the vicinity of the plant are bewailing the good old days when they could go to bed feeling that when they awoke the roof would still be attached to the frame-posts. The latest pyrotechnic happenings in the vicinity of the Richmond County plant seem to have been these: At an early hour of Feb. 28 a tank, capacity 60,000 naphtha gallons (luckily, at the time it went up it only contained 1,000 gallons), soared into the air with a report that awoke every sleeper on Staten Island, to say nothing of those who reside along the adjacent New Jersey coast line. The Fire Department prevented the subsequent flames from spreading. The gas men could not say how the thing originated. Happening No. II. occurred at 10 A.M. of March 9, at which hour and day dense volumes of smoke poured up and out of the Company's purifying house. The Edgewater fire laddies were speedily on hand, but their apparatus was not needed. The oxide material in a set of boxes refused to do more than a reasonable amount of work, and simply went up in smoke.

THE sub-committee of the Committee on Light, Richmond, Va., appointed to report on the extensions to be made on the city gas plant, recommend the immediate erection of six benches of 6's, to be fired under improved methods; also, the construction of a 700,000 cu. ft. capacity holder, to be located at the west end of the city. The estimated cost of this work, complete, is $123,000. It is quite likely the recommendations will be carried out; at any rate, they ought to be.

THE amended charter of the Louisville (Ky.) Gas Light Company, which compromise measure was passed by the lower branch of Kentucky's legislative assembly, on the 6th inst., grants, in "round words," a 30 years' exclusive right; price of gas shall at no time in first 10 years exceed $1.35, with 5 cents off for prompt payment; every 10 years the price of gas is to be adjusted by arbitration; the capital stock may be increased to $4,000,000—phew!—and the Company may issue $250,000 bonds. The Gas Inspector shall not be empowered to prosecute, and the works of the Company shall not be appraised, but must be valued as shown by the books. There is small doubt of the Senate's willingness to concur in the House amendments, and less that the Governor will interpose a veto. Judging from this, Mr. Barret may now have time to write a paper for the Western meeting. Perhaps his clearing up of an accumulation of "back-number" correspondence may, however, prevent him from preparing a paper.

THE Memphis (Tenn.) Gas Light Company has offered to supply gas to the public lamps at the rate of $1.75 per M., provided a 5-foot burner is used.

POTTSVILLE, PA., IN TROUBLE AGAIN.—As reported in the JOURNAL, last December the main holder of the Pottsville plant partially collapsed. Since then gas has been supplied direct from the works, of course, at great loss to the Company. The repairs to the holder would have been completed last Saturday, and the Supt. might then have had opportunity to get a night's sleep. Unluckily, the purifiers, unable longer to withstand the intense strain to which they had been subjected, gave way on the evening of Thursday, March 8th. The disastrous explosion which then occurred wrecked the purifying building, and also badly strained some of the connections on the works' side. Their pluck deserved more fitting reward. They have our sincere sympathy.

ANNUAL MEETING, CHARLESTON, S. C.—The annual meeting of the Charleston Gas Light Company was held on the 5th inst., a good majority of the stock being represented. The annual reports show that the ravages of the earthquake are being rapidly blotted out. The officers elected were: President, Thos. Turner; Directors, J. S. Gibbes, C. G. Memninger, A. S. Johnston, W. B. Smith, A. Simmonds, J. S. Riggs, G. W. Williams and M. Israel.

PUBLIC LIGHTING, CHARLESTON, S. C.—The public lighting of Charleston for the ensuing 9 months is to be carried out in accordance with the following contracts: Charleston Gas Company, 1,222 lamps (5-ft. burners, moontable), at $16.66 each; gas in public buildings, $1.80 per M. The Electric Light and Power Company to maintain 50 arc lights, to be located at such points as the authorities select, in consideration of the receipt of $6,300; or at the rate of $126 per lamp for the nine months.

ON THE 1st instant, Mr. Francis Murdock entered upon his duties as Clerk and Treasurer of the Newton and Watertown (Mass.) Gas Light Company, having been elected to this dual position at the annual meeting of the stockholders, held last February. The transactions of this Company have increased to such an extent, within the last five years, that it now becomes necessary for its Treasurer to give his undivided attention during business hours to matters connected with the corporation. The retiring Treasurer, Mr. B. F. Bacon, has served the Company since its incorporation, something over one-third of a century ago; and he richly merited the hearty vote of thanks awarded him by the stockholders on the occasion of his voluntary retirement.

PROVIDENCE, R. I., last year maintained 2,645 gas, 175 arc, 1,434 naphtha and 622 gasoline lamps. So far this year, 60 additional electric lamps have been ordered. The total expenditure of the Lighting Department during '87 was $136,118.67.

MARLBORO, Mass., has appropriated $2,400 to be expended for public electric lighting.

IT IS SAID that S. O. Daniels and others will form an electric light company for Framingham, Mass. The concern is capitalized in $100,000. We do not understand the necessity which exists for such a tremendous capitalization, for Framingham does not contain over 6,000 souls. Perhaps our informant meant to say $10,000, and that figure would seem to be pretty steep.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

How to Estimate Leakage.

OIL CITY, PA., Mar. 6, 1888.

To the Editor AMERICAN GAS LIGHT JOURNAL:

I beg leave to offer the following method of estimating leakage of gas mains—to wit:

Multiply number of joints by thickness of joint (lead or cement), by diameter of pipe, and by a constant—which may be called the co-efficient of leakage, and which will vary greatly as the mains are in good or bad condition in respect to jointing. This co-efficient may be determined, for any particular case, by dividing the ascertained leakage per year by the product of the number of joints multiplied by thickness of joints by diameter of pipe.

Usually the mains will be made up of several sizes of pipe, when each size should be treated separately, and the sum of the several products taken as the divisor, to find the co-efficient of leakage.

For example: A system of mains is made up of 4,000 joints of 12-inch pipe—jointing spaces, $\frac{1}{4}$ inch—and 2,000 joints of 8-inch pipe—jointing spaces, $\frac{1}{8}$ inch; leakage on this being returned at 2,400,000 cu. ft. per annum. Then

$$4{,}000\times12\times\tfrac{1}{4}=24{,}000,\text{ and }2{,}000\times8\times\tfrac{1}{8}=6{,}000,\text{ and}$$

$$\frac{2{,}400{,}000}{24{,}000+6{,}000}=80=\text{co-efficient of leakage.}$$

Yours truly, E. SQUIRE.

News for Mr. Larned.

OFFICE OF CONNELLY & CO., LIMITED,
177 BROADWAY, N. Y. CITY, Mar. 12, 1888.

To the Editor AMERICAN GAS LIGHT JOURNAL:

In your issue of Mar. 2 appears an inquiry from Mr. J. W. Larned, Supt. gas works, Frankfort, Ind., as to "the cause of the production of naphthaline in gas works using a jet exhauster;" and he follows up the inquiry with the statement that "in works using a rotary exhauster naphthaline is seldom seen."

The production of naphthaline is in no way influenced by a jet exhauster, or by an exhauster of any kind. It is ever present in all well-regulated gas works, and the problem is not how to prevent its production, but how to take care of it. If retained in the gas delivered to the consumers, its presence is a boon, as it increases the candle power; but if allowed to divorce itself at any time, without any warning—taking possession of the center-seal to-day or the scrubber to-morrow, possibly making its next appearance in the inlet to holder, and finally taking refuge in the services—it becomes a pest of the worst type. There are few managers of experience who have not made its acquaintance.

It is a mistake to say it is seldom seen in works using a rotary exhauster, for we have known of many trying experiences from naphthaline in such works; and three of the worst cases we are familiar with occurred in works using rotaries. Many works having no exhauster are often seriously troubled with it; and if these had jet exhausters in use the latter would in most cases be made to bear the blame for the trouble, in accordance with the old tradition that they produced naphthaline.

It is pretty generally understood that naphthaline deposits are influenced by certain changes in temperature, such as shocking the gas or sudden cooling, and it is asserted that the intelligent manager can perfectly control and cause its deposition wherever he wishes, simply by proper regulation of the temperatures in the condensing apparatus.

On this subject a very interesting paper* was read by Mr. J. B. Howard, of Dubuque, Iowa, at the 1885 meeting of the Western Association, held in Chicago, to which we would refer Mr. Larned.

Regarding the second inquiry, your space is too valuable to answer it fully in attempting to treat on all the points having a bearing on the subject. To answer it briefly, iron sponge will purify 200,000 cu. ft. per bushel during its "life," provided it is kept clean and free from tar or oils. Its "life" varies from one to four years, according to the service rendered and the care taken to keep it clean.

When used to purify gas from Pennsylvania or Pittsburgh coals, four charges are usually sufficient for each set of boxes; but for Western coals each set should be provided with six or seven charges.

Very respectfully,
CONNELLY & CO., Ltd.

*See JOURNAL, Vol. XLII., June 16, 1885, p. 911.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—JOS. R. THOMAS, C.E.
Asst. Editor—T. J. CUNNINGHAM.
Manager—C. E. SANDERSON.

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At No. 42 Pine Street, New York.

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LIGHT, HEAT, STEAM, WATER-SUPPLY,
VENTILATION, SANITARY IMPROVEMENT
AND GENERAL SCIENCE.

TERMS

SUBSCRIPTION—Three Dollars per annum, in advance.

FRIDAY, MARCH 16, 1888.

Brief Obituary Mention.

B. H. BARTOL.—Mr. Bartol's demise occurred at his late residence, 1900 Spruce street, Phila., Pa., on the afternoon of February 10. As is our usual custom, we deferred making mention of this sad event until we could accompany our notice with some authentic account of his life and work; but diligent inquiry failed to elicit a connected history of his earlier years. This we regret, for deceased had ever been an enthusiastic advocate of gas lighting.

It is measurably certain, however, that to his busy brain and practical hands can be traced the great inventions which revolutionized the art of sugar refining. His earlier struggles against fortune's buffets would undoubtedly furnish most interesting reading, but our wish to present these is unfortunately frustrated.

Deceased amassed a large fortune by prudent investment, the chief portion of which accrued from his ardent belief in the permanency of gas shares. Through the kindness of Messrs. G. A. McIlhenny and C. B. Bailey, of the Washington (D. C) Gas Light Company, we are enabled to say that the late Mr. Bartol was elected President of that corporation on November 14, 1864, which office he held during 19 consecutive years. After his resignation—he was succeeded by Mr. McIlhenny—he remained a Director up to the day of his death.

Perhaps Mr. Bartol's way of doing things is well shown by his course in connection with the Washington Company; for at the time he took charge of its affairs it was virtually bankrupt. Undismayed at the outlook, and firm in his belief, his consummate skill and ability eventually caused it to become one of the most prosperous gas undertakings in America.

JAMES HOW.—The death of Mr. James How, of Brooklyn, N. Y., whose taking-off came with appalling suddenness—he was stricken down by appoplexy, on the evening of February 28—removed a busy life that had for many a year been crowned with honor.

Mr. How was one of the original promoters of the Brooklyn Gas Light Company, having been elected a Director therein, at the organization meeting, held March 22, 1849, and ever since had manifested much zeal in connection with the Company's progress. His history is that of an honorable and public-spirited citizen. To him perhaps more than to any other should be attributed the founding of Brooklyn's Polytechnic Institute.

The Market for Gas Securities.

The market during the fortnight was the most remarkable one ever chronicled in the financial history of New York city, and it may be taken for granted, when the bulls and bears of Wall street closed up their huge shop, because of the reign of a far-Western visitor, that King Blizzard is a most potent monarch—the sort of potentate which the most ardent speculator would hesitate about selling a "spread" on. Two whole days without a quotation; and the third day quite like the other ones. Consolidated in the peaceful days of the fortnight, showed a remarkable depression, the last authentic quotation—Friday last—having been at 73. There is no reason for it, however; and there is no better purchase on the whole list.

Equitable is strong, 20 shares having been sold at auction at 110. It will go higher. We also note a sale at auction of 80 shares Equitable, of Utica, N. Y., at 82½. Mutual is steady. Brooklyn shares are neglected. Quotations on outside shares, up to March 12, are 61½ for Baltimore Consolidated, and 30 to 32 Chicago Gas Trust. The Boston *Advertiser*, March 8, reports a sale of Boston gas at 200. The Sandusky (O.) Company's capital stock has been increased to $150,000, from $125,000. We have no further advices from points out-of-town.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 WALL ST. NEW YORK CITY.

MARCH 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	—	—
Central	440,000	50	30	—
" Scrip	220,000	—	47	57
Equitable	3,000,000	100	110	—
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	115	118
Mutual	3,500,000	100	90	92
" Bonds	1,500,000	1000	101	—
Municipal, Bonds	750,000		—	—
Northern	125,000	50	30	—
" Scrip	108,000			
Yonkers		50	—	80
Richmond Co., S. I.	300,000	50	50	—
" Bonds	12,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	102	—
Citizens	1,200,000	20	—	54
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	128	132
" Bonds	300,000		—	106
Peoples	1,000,000	10	63	66
" Bonds (5's)	368,000	—	97	—
" " (6's)	94,000	—	100	—
Metropolitan	1,000,000	100	75	79
Nassau	1,000,000	25	100	105
" Ctfs	700,000	1000	98	100
Williamsburgh	1,000,000	50	118	121
" Bonds	1,000,000	—	111	—
Out of Town Gas Companies.				
Boston (Mass.) Gas Co.	2,500,000	500	190	—
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	140	145
" " Bonds.	45,000	—	—	—
Chicago Gas Trust	25,000,000	100	30	33

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Four Sets of 6-Inch Castings for 5's. Hydraulic Main 20-Inch.

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MANUFACTURERS OF

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Streets, Parks, Public Buildings, Railroad Stations, etc.

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1	"	3's, Palatka, Fla.
4	"	5's, Fitchburg, Mass.
2	"	5's, North Adams, Mass.
1	"	6's, Saco, Me.
1	"	5's, Georgetown, D. C.
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Address, for further particulars,

WALDO BROS., 88 Water St., Boston, Mass.
Balto. Retort & Fire Brick Co., Balto., Md.
And **H. C. HANN,** Patentee and Contractor for all kinds of Gas House Masonry, **607 S. Paca St., Balto., Md.**

GAS AND ELECTRIC LIGHT COMBINED.

Office Washington Gas Company, Washington, Daviess Co., Ind., Feb. 17, 1888.

The Waterhouse Electric and Mfg. Co., Hartford, Conn.—Dear Sirs: In answer to yours of recent date, inquiring "What do you think of the Waterhouse System," etc., we can say that we have clearly and satisfactorily demonstrated—in the face of decided opinion and advice of electric light and steam engine men "that no system of electric lighting could be successfully run by a Gas Engine"—that it can be done. Under the test applied by your Company, with our 25-H.P. Otto Gas Engine we can furnish Thirty-five 1700-C.P. (8¼ ampere) electric lights from the 35-light Dynamos supplied us by your Company. Our electric light plant is a patron of our Gas Company. We are at present furnishing to the city and private consumers Eighteen 1700-C.P. arc lights, which are pronounced by everyone familiar with electric lighting *equal* in *Brilliancy*, *Steadiness*, and *Beauty* to the lights of any other system, if not ahead of them all. After a thorough investigation, we adopted your system as one combining more nearly *perfection* in mechanical and scientific construction than any other, and as yet we have no reason to change our opinion in that regard. Have found it easy of management; have had but little trouble in operation during the storms and cold of this severe winter; and regard it safe and reliable. Yours,

JOHN M. WOODSON, Gen'l Manager. JOS. C. LORD, Supt.

The Best Electric Light in the World. Gold Medal Awarded, Mechanics' Exhibition, Boston, December, 1887.

THE WATERHOUSE ELECTRIC AND MFG. COMPANY,

Factory, Colt's West Armory. **Hartford, Conn.**

To All Whom It May Concern!

The SIEMENS-LUNGREN COMPANY hereby warns the public against the use of various infringing Regenerative Gas Lamps which are offered for sale. This Company has heretofore delayed bringing suit to enjoin the manufacture or importation of such infringing lamps, solely because of the practical worthlessness of the infringing devices; and although, in each instance, they infringe some one or more of the various patents owned or controlled by this Company, they have fallen into disuse sooner than any suit could be brought to a hearing. As, however, the introduction of these infringing lamps has tended to discredit the practicability of our Company's system of regenerative gas lighting, we have instructed our Attorneys, Messrs. Geo. Harding, C. S. Whitman, and Silas W. Pettit, to give notice that legal proceedings will in future be taken against all such infringers.

THE SIEMENS-LUNGREN CO., 21st St. & Washington Av., Phila., Pa.

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No. 333 WALNUT STREET,

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A very general demand exists, in both large and small Gas Works, for an apparatus that will be absolutely efficient in the removal of the tar which passes the hydraulic main and condenser. Many attempts have been made to accomplish this, but, I believe, without success, until the introduction, five years ago, in England, of the C. & W. Walker Patent Tar and Carbonic Acid Extractor. During these years this apparatus has been adopted by many of the most prominent Engineers, not only in England, but also on the Continent of Europe and in other parts of the world. It is only necessary to give here a partial list in order to convince any intelligent American Gas Engineer that this machine must have succeeded fully in accomplishing the desired results.

The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fitted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractor has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

"The C. & W. Walker Tar and Carbonic Acid Extractor has been in operation at these works for the past six weeks, and is an unqualified success. It removes every particle of Tar from the gas in once passing through the apparatus, and a large percentage of the Carbonic Acid. I also feel quite sure that it prevents the formation and deposit of Naphthaline, because since I started the Washer I have had no stoppages from this cause. These works have been seriously troubled with Tar for many years, and I have used several kinds of apparatus and every expedient which has come to my attention for dealing with the difficulty, but without success. The Walker apparatus occupies comparatively small space, is less expensive than other systems, and requires but little attention. I carry 2½-inch seal, and have an automatic tar delivery valve. This Tar Extractor is indispensable to gas makers."

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JOHN H. McELROY, Engineer.

ALLEGHENY, PA., Sept. 24, 1887.

GEO. SHEPARD PAGE, ESQ.:

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ROBT. YOUNG, Eng. and Supt.

OFFICE COLUMBUS GAS LT. AND COKE CO., COLUMBUS, OHIO, October 14, 1887.

GEORGE SHEPARD PAGE, ESQ.:

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Yours truly, E. McMILLIN, V. P. & Gen. Mangr.

GEORGETOWN, D. C., Sept. 27, 1887.

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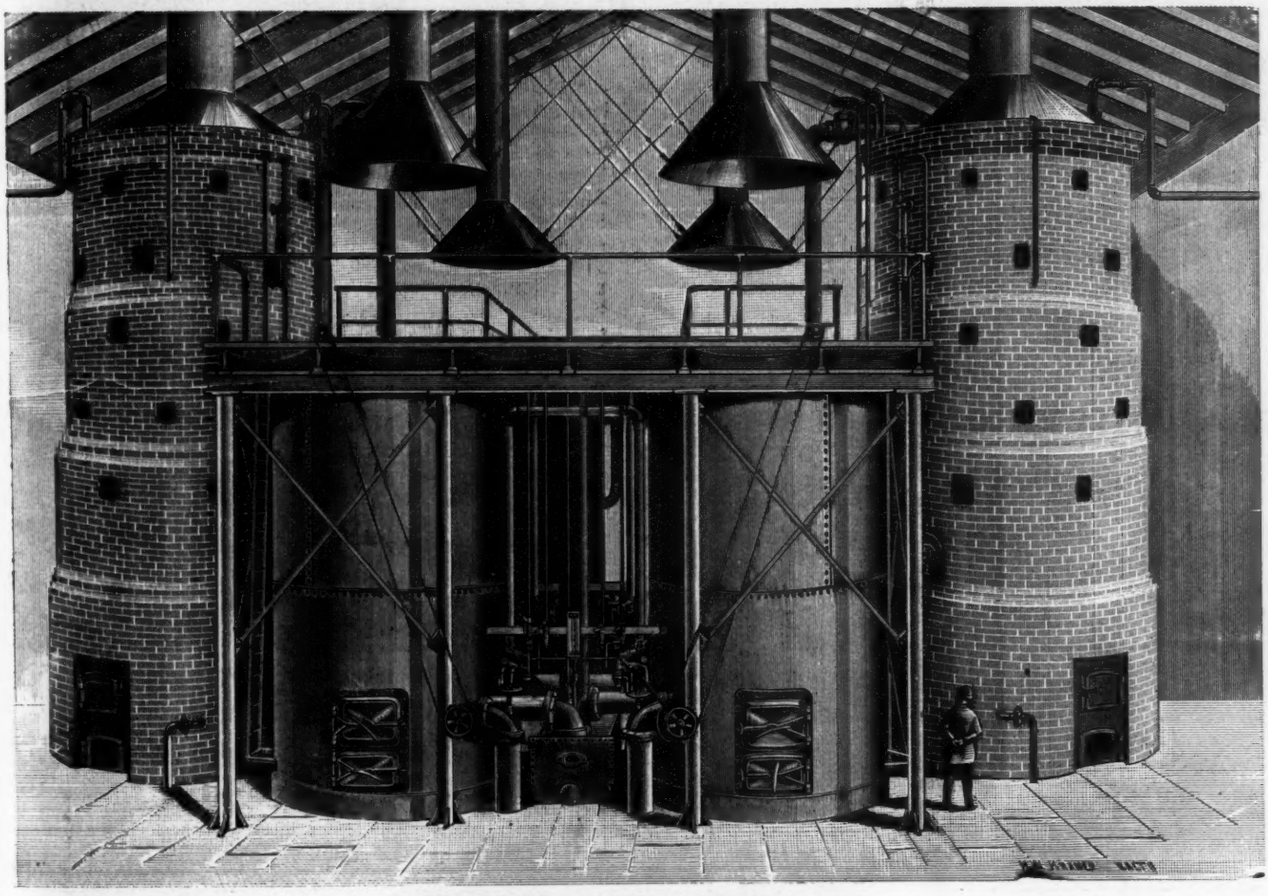

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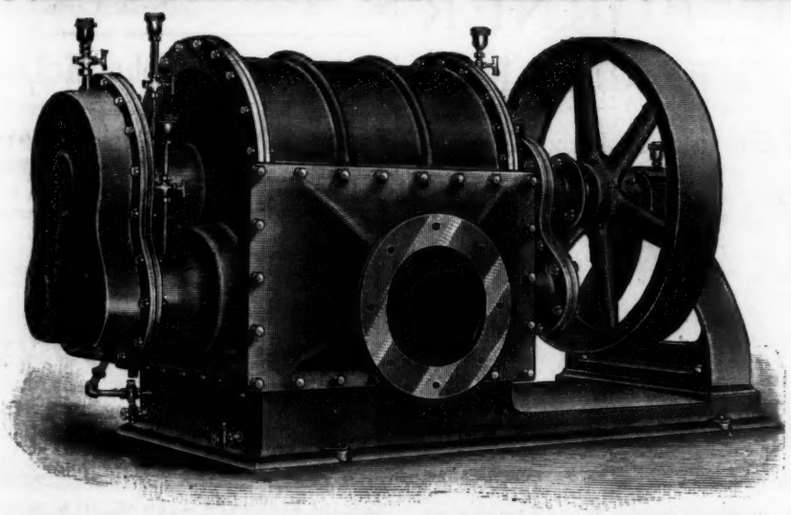

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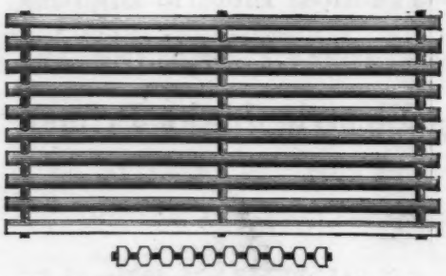

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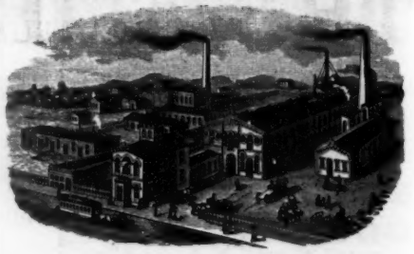

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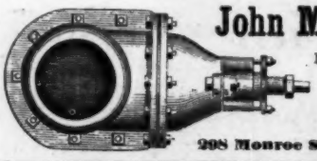

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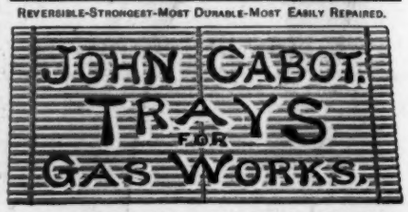

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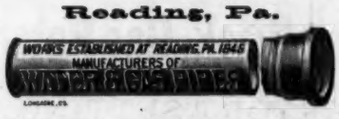

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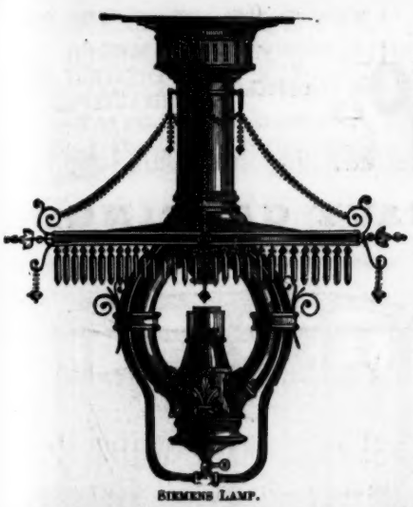

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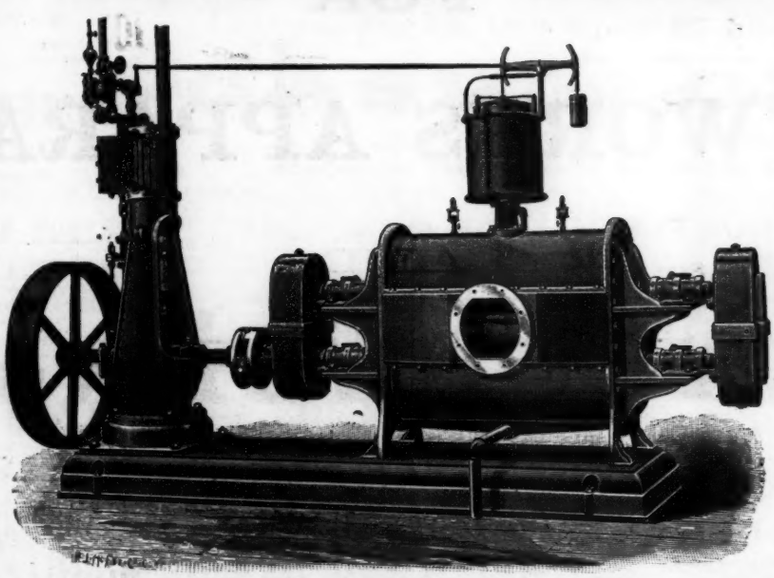

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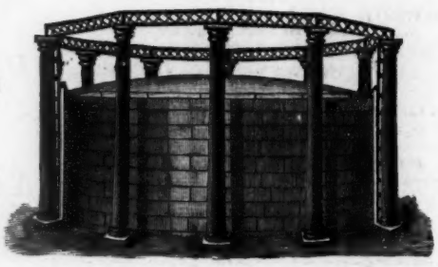

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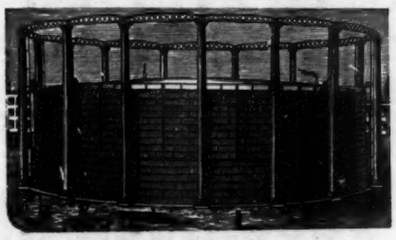

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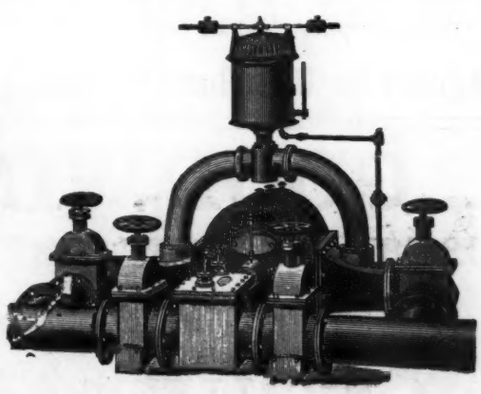

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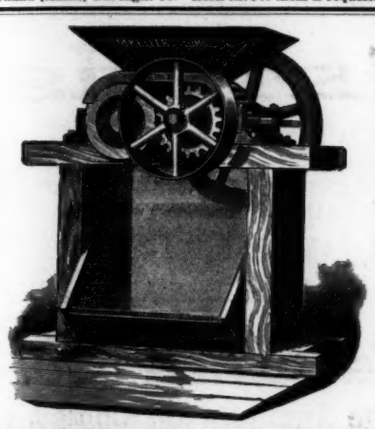

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